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LECTURE I.

INTRODUCTION.

THE subject of these lectures is derived from certain observations made in the course of a research lasting more than 20 years. In 1903 when I was in Göttingen Prof. Aschoff suggested a research on the mechanism of the peritoneum in resisting infection. I well remember his answer when I objected that the work suggested was very difficult; he replied, "Yes, if it were not so it would have been done before." I should like to express my gratitude to him for stimulating the spirit of research work, which he then aroused. When this was completed I proceeded on a similar investigation in respect of the lungs in a private laboratory at King's College, the results of which were published in the *Journal of Pathology and Bacteriology* (1907).[1] This investigation showed the paramount importance of cells lining the alveoli, the "staube-zellen or herzfehlerzellen," which are strongly phagocytic to inorganic and organic material. It also showed that the activity of these cells was greatly enhanced by the presence of serum. My work showed the importance of stasis allowing plasma or serum to escape from the blood-vessels into the alveoli and the importance of approximating the alveolar cells to the object to be destroyed. It was a natural step from this to investigate the mechanism by which expansion of the lungs was diminished, a process which should achieve both the objects desired.

For some three years or more I performed experiments to determine differences of action of the two halves of the diaphragm; these experiments were carried out by a modification of Head's[2] method of utilising the xiphisternal attachment of the diaphragm in the rabbit, divided into right and left halves. Many experiments were made by injections into the lung, pleura, pericardium, by irritation of the peritoneum or the abdominal viscera, by traction on mesentery in the endeavour to produce an alteration in the contraction of one diaphragmatic slip. These observations were, for the most part, entirely negative, positive results showing a reduction of 10–12 per cent. of movement were obtained on the side to which heat or cold was applied, and a similar reduction when the animal was laid upon one side.

About this time, 1909, Pasteur[3] published several papers and read the Bradshaw lecture to this College on the subject of massive collapse of the lung. From the point of view of pulmonary mechanism this was a most important contribution. It provided an identification of one of the unknowns in an equation, and it appeared to me that a considerable advance would accrue if it was possible to discover the factors upon which this collapse of a definite part of the lung depended. An accidental observation led to a routine examination of the muscles which act upon the thorax, both in health and disease, and subsequently to an examination of respiratory movements of different parts of the chest and abdomen, which have been recorded on a kymograph.

I shall deal in these lectures with some of the results of this investigation, the mechanism of respiratory movement and of pain and dyspnœa arising in respiratory muscles. The first step must treat of respiratory movements in general.

CONCERNING NORMAL RESPIRATION.

The generally accepted theory of the mechanism of respiration postulates a respiratory centre or centres lying in the lower part of the pons and medulla, from which fibres pass to the phrenic nuclei lying in the middle region of the cervical spinal cord. From this spinal centre originate the phrenic nerves, whose principal function is to conduct impulses to the diaphragm causing it to contract. The thoracic respiratory muscles must also be activated by connexions with these centres. The depth of each respiration so produced is regulated through the vagus by means of impulses arising, either from the volume of the lung, according to the Hering-Brauer[4] reflex, so fully investigated by Henry Head,[5] or by impulses arising from the passage of air over the bronchial mucous membrane, as suggested by Lumsden.[5] These impulses acting on the higher respiratory centre control the respective phases. The higher centre is governed by the pressure of CO_2 in, and the reaction of, the blood. It is, however, generally recognised that either the higher or lower centre can be affected by other means. It is obvious that a certain amount of conscious control of respiratory movement, either of the chest or of the diaphragm, is present in most individuals. It is equally obvious that pain and certain subconscious processes, so frequently illustrated in novels, have an influence upon the type of respiration.

In general, the body does not work its various organs to the full; I think that that is a deduction made from Sir John Rose Bradford's work on the kidney,[6] which showed that it was necessary to remove at least three-quarters of the kidney before polyuria developed. Keith[7] has stated that the respiratory mechanism under ordinary circumstances works only at 5 per cent. or 10 per cent. of its capacity.

It is therefore clear that in the general muscular mechanism of respiration a very considerable degree of selection is possible as to which muscles, diaphragm or thoracic, shall contract. They are not all wanted all the time, but all are wanted some time or other, and we should expect that apart from conscious control the body will have some means of calling on now one muscle, now another, to do extra work—or a different type of work—to accommodate the act to the variable circumstances of life. I shall show later that such a mechanism exists, and that it is of clinical import.

Though it is a commonplace of the text-books that respiration in man is either diaphragmatic or thoracic, yet none mention the features characteristic of the two types, or attach importance to the subject, and there is a general tendency among clinicians to consider inspiration, and that forced and voluntary, alone, except in a few pathological conditions in which expiration is obviously obstructed.

RESPIRATION, DIAPHRAGMATIC OR THORACIC.

I know of no work which attempts to explain the interdependence or differentiation of these types of breathing, abdominal and thoracic. My task is, therefore, rendered considerably easier in that I have not to refer to the very large body of literature which exists on the subject of respiratory movements, dating from the time of Hippocrates down to the present day.

In the Arris and Gale Lecture[8] (1919) I drew attention to the characteristic features of the two types of respiration—viz., the diaphragmatic, in which respiration is carried out practically entirely by the diaphragm (demonstrated externally by protrusion of the abdomen), and the thoracic, which is characterised by expansion of the bony thorax. Although the majority of individuals represent a combination of these two mechanisms in varying proportions this distinction of type must form the basis of any study of the mechanism of respiration. Such a study will involve an investigation of the movements of different parts of the chest, epigastrium, &c., and of the muscles which produce such movements.

I propose in this lecture to try to elucidate the various factors which influence the general type of

quiet respiration seen in different individuals (as determined by tracings of movements and action of muscles). I should like to emphasise the fact that this part of the investigation has been made on normal individuals at rest, and as far as possible under circumstances in which the attention has not been directed to the question of breathing.

Method of Investigation.—The first difficulty that has to be contended with is the elimination of the effects of those muscles which are concerned with maintaining the balance of the body, for when standing the body sways continuously, requiring action by the muscles of balance, some of which are attached to the thorax, and exert influences on respiratory movements.* With this object, and to make the results as practical as possible, I have adopted a standard posture for investigations. The subject is placed on a couch, the back of which is inclined at an angle of 45 degrees, and a pillow is placed beneath the shoulders, the head being suitably supported. This enables a comparison of results obtained on normal people with those obtained on the sick, for the posture described is a comfortable one for examination of bedridden patients. In this posture the muscles of the back, which is in contact with the couch, cannot be examined. Similarly, tracings are confined to movements of the anterior and lateral aspects of the chest and abdomen.

Natural Variability.

I can state at once that in my investigations by chest tracings I have never met with two individuals who breathe in precisely the same manner, nor is it possible on successive days to secure identical tracings of the same individual.* This is not due to faults of technique. It is practically impossible to adjust an individual in exactly the same position on two successive days, or to guarantee an identical condition of his abdominal contents. The second reason for constantly finding differences arises from the point mentioned above—namely, that conscious and subconscious processes exert an influence on the manner of respiration.

Differentiation between the Two Forms of Breathing.

With this outline and criticism of the general methods I can proceed to the main part of the work, the differentiation and relationship of thoracic and diaphragmatic breathing and the muscles acting in either form.†

IMPORTANCE OF EXPIRATION.

The general mechanism of inspiration is much more complicated than that of expiration. There is considerable physiological evidence for considering that expiration, the excretory act of the lung, is of more importance than inspiration, for carbon dioxide plays a more important rôle in the immediate regulation of respiration than does oxygen. I shall, therefore, proceed to discuss expiration, and to consider inspiration as a means of preparing for the former act.

The Quadruped.—If we examine the mechanism of expiration in the quadruped it is clearly largely a passive act. The relationship of the abdominal viscera to the diaphragm is such that when the diaphragm, after contraction, relaxes, it must be carried into the position from which the next inspiration will follow, by the weight of the liver and other abdominal organs. In addition the effect of the elastic contraction of the lungs must be considered, and this, I may remind you, is of extreme importance in all questions of respiration.

In an experimental animal breathing deeply under an anæsthetic the chest moves but little, and expiration depends on the elastic recoil of the lungs, which may be assisted by the weight of the abdominal viscera. The abdominal muscles do not contract. The effects of obstructing expiration are instructive. If the animal be allowed to inspire freely, but is made to expire against resistance, and such resistance is gradually increased, it will be found that with each inspiration the diaphragm attains a lower level and thus fills the lungs with more air. It is only (in the case of a cat) when 13 or more centimetres of water are the obstructing force that any sign of increased chest movement and contraction of the abdominal muscles is observed. Short of this point the expiratory force seems to lie in no muscle but in the lungs alone; and if the resistance is slightly diminished, so that some air can be expired in spite of the resistance, the chest walls will not come into action unless, and until, asphyxia is beginning to develop—that is to say, with 7 or 8 cm. of water pressure obstruction, expiration is carried out by the lungs alone. In the cat in a vertical position with the abdomen widely opened the elastic recoil of the lungs is sufficient to elevate the diaphragm, liver, and stomach, with the added load of 25 g. There is no reason to think that the human lungs are less efficient.

In quadrupeds, therefore, quiet expiration is carried out by the elastic recoil of the lung associated with a passive falling back of the diaphragm. Thoracic expiration, such as it is, and confined to the lower part of the chest, may be either due to elastic recoil of the ribs or assisted by muscular action.

In Man.—When we apply these factors of the mechanism of expiration to the upright posture of man we find the conditions different. The elasticity of the lungs remains, but consequent upward movement of the relaxing diaphragm is hindered by the action of gravity on the abdominal contents. We are met with a new condition in the development o greater respiratory movement in the thorax, notably in the upper ribs, which are not now used to support the weight of the body. Gravity will, however, operate to depress the thorax elevated in inspiration.

Thus we see that orthograde man has converted the help of gravity on the diaphragm in expiration into a loss, but has gained by taking his weight off the upper limb, and so allowing the thorax to expand more easily.

The Action of the Abdominal Muscles.

The action of the abdominal muscles in man is important in this connexion. It is tempting to think that the abdominal muscles by their contraction on the abdominal viscera are reciprocal antagonists to the diaphragm, and will push the diaphragm upwards. I believe that this is not their function though the elastic recoil of the abdominal wall may have such an effect.

We find that there are a number of people who, examined in the standard posture I have described, protrude the epigastrium by means of the diaphragm during inspiration, but develop no contraction in their abdominal muscles which can be detected either in inspiration or expiration. In another class abdominal muscular contraction can be detected during expiration; if constriction be applied to the lower part of the thorax in these individuals the abdominal muscles become quiescent, although the inspiratory propulsion of the abdomen is increased. And again, if an individual is laid supine there may, or may not, be expiratory contraction in the abdominal muscles, but in any case this is produced or increased when the foot of the couch is elevated. This elevation of the foot of the couch must increase the tendency of the abdominal contents, by the action of gravity, to move towards the head, and thus press the diaphragm up and assist expiration, and in this case the abdominal muscular contraction would be redundant. At the same time this position does tend to cause the thorax to proceed in the cephalic direction, and in order to produce the next inspiration it is requisite that the thorax be restored to its original position—that is, towards the hinder extremity. The abdominal muscles in this position must act as depressors of the

* The asterisks throughout refer to points demonstrated by means of lantern slides.

† It is worth drawing attention to the fact that many investigations * have been made on the diaphragm to show that it is not of the same constitution as an ordinary voluntary muscle. These have failed to demonstrate any difference of structure between the muscle-fibres of the diaphragm and those of other skeletal muscles, and I shall show they are similar in respect of action.

thorax. Further, in the case of a boy with congenital absence of all abdominal muscles,[10] respiration was chiefly by the diaphragm and not, as anticipated, by the thorax.* This boy could play full back at Association football.

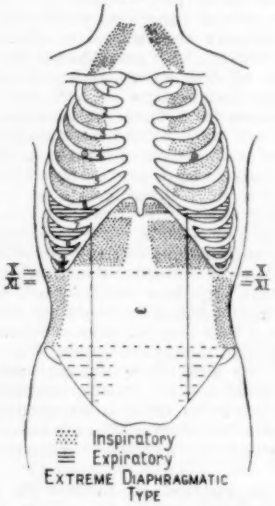
There is thus good reason to believe that the abdominal muscles connected to the thorax assist in the expiratory act of the thoracic mechanism, and not in that of the diaphragm, and we must accordingly assume that in the orthograde who inspires mainly with his diaphragm the important function in expiration is the elastic recoil of the lung.

Inspiration Preparatory to Expiration.

(*a*) *Diaphragmatic.*—In quadrupeds inspiratory enlargement of the cavity of the thorax is mainly in the long axis of the body. In orthogrades there is the additional capacity to enlarge in the transverse and anteroposterior diameters. In animals there is but little thoracic expansion; the mechanical advantage in expiration lies in a preceding inspiratory increase of the long axis of the thorax, for it is in this axis that the main bronchus to the lower lobe is to be found, and it is around this structure that the great mass of elastic tissue of bronchi and vessels is situated. In man the cavity of the thorax can be increased in this direction by two means, by the depression of the diaphragm, or by an elevation of the thorax, the diaphragm remaining taut, and can be further increased if the lower borders of the bony thorax, from which the taut diaphragm takes origin, are depressed. In man, the muscles which can be palpated and are found to be concerned in this act of enlargement are, at the upper part of the thorax, the scalenes and, at the lower part, the external oblique controlling the tenth, eleventh, and twelfth ribs, that part of the transversalis abdominis controlling the seventh, eighth and ninth, and that part of the triangularis sterni controlling the sixth rib (Figs. 1 and 2). By these muscles the whole chest is elevated and the three lower ribs tend to be moved towards the pelvis. The sixth, seventh, eighth and ninth are drawn towards the middle line and depressed, or prevented from rising during inspiration. Elevation of the thorax by the scalenes alone causes an increase in the anteroposterior and lateral diameters. This is seen in cases of paraplegia from lesions in the lower cervical and upper dorsal regions. This elevation of the thorax by the scalenes has a somewhat similar effect on the upper ribs to that produced by contraction of the intercostal muscles. These ribs are raised and the anteroposterior diameter especially the transverse to some extent, are increased. The lower end of the sternum is rotated forwards owing to the greater length of the sixth and seventh ribs.

When expiration occurs these muscles relax, the chest as a whole descends by gravity, and to restore the lower ribs to their original positions the intercostals of the lower spaces contract. This muscle complex is one not infrequently met with in those whose type of breathing is not at all thoracic or intercostal. They are of the type of visceroptosis or prævisceroptosis. It is noteworthy that in inspiration both the diaphragm and the muscles of the abdominal wall in the epigastric and lateral regions contract, leaving the umbilical and hypogastric regions unprotected by muscular effort.

FIG. 1.



The contraction of the upper intercostal muscles is much less in the extreme diaphragmatic type of breathing than in the extreme thoracic type.

FIG. 2.

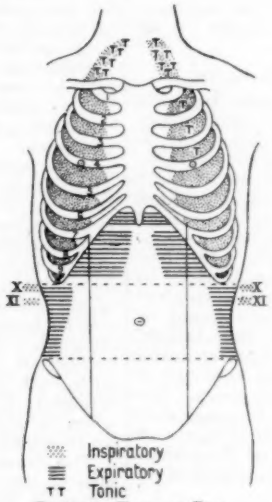
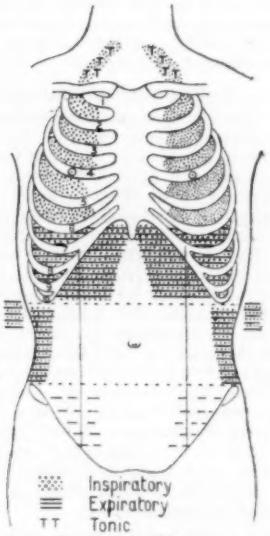


FIG. 3.



(*b*) *Thoracic.*—The thorax can be expanded in its individual parts by the intercostal and interchondral muscles which elevate and evert the ribs. The greatest increase is in the transverse axis. In this type of breathing, when easy, the thorax as a whole is not elevated by the scalene muscles. In the thoracic type as an auxiliary to inspiration the chest can be held elevated as a whole by the scalene muscles, and especially by the anterior scalene which possesses a mechanical advantage over the other scalenes as regards elevating. By raising the first rib a mechanical advantage is afforded to the ribs lying caudalwards. By holding the first rib elevated this mechanical advantage is further increased, the ribs being already partially raised and everted prior to the commencement of the intercostal inspiratory contraction.‡

In expiration the intercostals relax and the ribs descend, but the elevation by the scalene action frequently remains. This type is found in those who do not distend the abdomen in inspiration, but in whom the epigastrium may actually recede.

The structure of the lung is such that the elastic recoil cannot be as great in the transverse as in the longitudinal axis. Expiration in the thoracic type of breathing is assumed to be dependent on the force

‡ Sometimes, in addition, a contraction can be felt during expiration in the scalene muscles, and if so, it will be found in the anterior scalene. The explanation of this latter contraction is not obvious. Prof. Barclay Smith has suggested that in some cases its arrangement may be such that by contracting it pulls back the first rib, and so tends to depress the thorax: or it may ease the descent of the thorax. The interchondrals of the upper spaces occasionally contract during expiration though usually this action is inspiratory.

of gravity acting upon the elevated ribs causing reduction of the lateral and anteroposterior diameters, the muscles elevating the ribs relaxing. These diameters can be further reduced by the constricting action of the triangularis sterni, transversalis abdominis, and lateral oblique muscles.* The elastic recoil of the ribs and cartilages may also play a part. It is, however, uncertain whether the recoil assists inspiration or expiration.

The purer the type of thoracic breathing the less will be the increase in the long axis and the less the expiratory action of the elastic tissue of the lung in that particular axis. Expiration will be the more efficient the greater the elevation and the eversion of the ribs during the preceding inspiration.

Again we find the muscles in the epigastric and lateral abdominal wall regions contracting simultaneously, but in expiration, and no contraction occurring in the umbilical and hypogastric regions. In the expiratory phase, however, there is not such an increased intra-abdominal tension, the diaphragm not descending. There is, therefore, not the same tendency to a yielding of the hypogastrium as occurs in the diaphragmatic type.

COMBINED DIAPHRAGMATIC AND THORACIC.

Thus it is seen that we have an apparent paradox in that a muscle may be now inspiratory in function, now expiratory. The combinations which occur in the average individual who is a mixture of these extreme types (Fig. 3) make the matter one of great complexity. The contraction which helps inspiration in the pure thoracic type may have the opposite effect in the diaphragmatic type and help expiration—e.g., the intercostal muscles of the lower spaces. Further, a muscle may be both inspiratory and expiratory in action during the course of a single complete respiration. A common example of this latter is found in the actions of the triangularis sterni. In addition some of the powerful muscles concerned in maintaining posture are attached to and affect the movements of the whole or parts of the thoracic cage—e.g., the rectus abdominis. The important fact to remember is that in any individual an alteration of attitude or position of body will alter the manner of breathing, as a result of alteration in and the contraction of different muscles.

CONDITION OF MUSCLES NOT ACTIVELY CONTRACTING.

A further very important question in connexion with the muscular side of the respiratory act is that of the condition of those muscles constituting the walls of the thoracic cavity during any period when they are not actively contracting. Though in this sense they may be relaxed their condition in no way resembles that of paralysed muscles. They are in a condition of postural tone, which is appreciated as a persistent resistance by the finger. In the same manner the diaphragm, however small may be the contraction of the dome in the thoracic type, must maintain a continuous degree of tone, otherwise it would be drawn up into the chest during inspiration. Such an inspiratory elevation relative to the chest wall has, I believe, never been seen by the X rays except where the phrenic nerve is paralysed.

I therefore believe that those respiratory muscles which are neither actively contracting nor in flaccid relaxation are in a condition of mild persistent contraction—postural tone.‖

As stated previously, the majority of individuals tend to employ a combination and alternation of these two mechanisms, the thoracic and diaphragmatic, and the conditions under which various movements occur now remain to be discussed. This involves a consideration of the present-day teaching in respect of nervous impulses and muscular contraction.

Physiology.—The all-or-none theory is accepted for both. By this is meant that if a nerve-fibre conducts an impulse at all, it will be of the maximal strength possible for the condition of the nerve at that time, and similarly, when an individual muscle-fibre is excited its response is maximal if it responds at all. In order to account for the graduated action of muscle, it is assumed that except in maximal activity all the nerve-fibres of a nerve are not activated at the same time, and, therefore, all the fibres of a muscle supplied by the nerve are not brought into action at the same moment. As regards the nature of nerve discharge, it has been shown by Dittler [11] in the phrenic nerve that both during inspiration and expiration action currents can be detected, and that in inspiration these are at the rate of a considerable number per second. They have been variously estimated at 30 to 90 or more per second.

Of muscle there are several functions which should be mentioned. As regards the actual contraction of muscle, Starling [2] states, "So far, therefore, the evidence is in favour of the view that voluntary contraction and tonic contraction of all skeletal muscles are discontinuous in nature, and analogous to the tetanus which we may evoke artificially by rapid stimuli, either of muscle or of motor nerve," and again, "Both in muscle and nerve the evidence is that each contraction is a fused series of single contractions evoked by discharge down the nerve of 50 to 70 excitations per second." There is also evidence to show that summation of nervous stimuli is responsible for the slow tetanic contraction of muscle and such nervous impulses must of necessity be minimal. The example quoted by Starling is that of the retractor penis. For this muscle a stimulus can be found which is insufficient to produce a contraction. If repeated, the first three or four may be ineffective and then contraction occurs, increasing with each succeeding stimulus until a maximum is attained. The same initial increase of effect is observed when a voluntary muscle is excited continuously by recurring stimuli.

The term "tone" is applied to muscle in two senses, first, in the popular sense in which tone indicates well-being. Of the factors concerned in this little is known, except that when individuals are in general good health the tone of muscle is also good, and it may be assumed that such conditions as produce ill-health have a certain effect in diminishing the tone of the muscles.

The second application of the term "tone" is connected with the condition of postural tone, which has been so largely elucidated by Sherrington.[13] Postural tone implies a condition of contraction of muscle to maintain a part in a certain position against resistance, and can be sustained for long periods. Action currents have not been detected hitherto in this condition. It is chiefly concerned in the maintenance of certain postures such as standing, and can be relaxed or resumed in accordance with the needs of the body when movements are performed or cease. Sherrington gives as an example, which is readily understood, the condition of the bladder which maintains a constant pressure on its contents, although allowing a gradual addition to those contents. It is, theoretically, quite probable that such a condition exists in the respiratory muscles to prevent intercostal spaces falling in, to maintain thoracic elevation, and to maintain the level of the diaphragm.

There is also to be considered the effect of tension of the muscle, or as it may preferably be called "stretch." This was the subject of work by Blix,[14] who showed that the degree of response of the muscle was considerably affected by the degree of stretch—i.e., that stretching the muscle passively tended, within limits, to increase the strength of contraction when stimulated.

This was also demonstrated by Prof. Starling [15] in the Linacre Lecture as being of supreme importance in the response of the left ventricle of the heart

‖ The condition of inspiratory recession in the epigastrium which is met with in the marked type, and which formerly was attributed to a paralysis of the diaphragm is, I believe, the result of the sudden relaxation at the end of inspiration of the transversalis abdominis, and the resultant equally sudden eversion of the lower ribs, carrying with them the upper abdominal viscera, which allows a sinking in of the epigastrium. Under such conditions a late and slight degree of propulsion is frequently seen in the epigastrium at the end of inspiration.

when the output by the aorta was hindered. He showed that a process occurred by which the ventricle, not emptying itself fully with each contraction, dilated and accommodated more blood, thus stretching the individual muscle-fibres. The subsequent contractions were, within limits, increased in force until the obstruction was overcome. There is an optimum degree of stretch for this reaction. With greater or less degree of stretch the strength of contraction diminishes.

It remains to see whether these physiological laws can be applied to, and explain some of the phenomena which have been observed clinically.

Of Nerve—Muscle Preparations.

The problems connected with nerve and muscle have been freely studied by physiologists, but in a manner which, though producing interesting and valuable results to the physiologist, are of little direct use to the clinician. The stimulus applied to the nerve is of such a strength that it is extremely improbable that stimuli or muscle contractions of similar strength ever occur under natural conditions. Both in form and degree the contraction produced by maximal stimuli is totally unlike that which occurs in the body, and in order to arrive at conclusions which might assist clinical observations, it became necessary to imitate more closely the conditions which actually occur in the body.

Clinical Observations.

The clinical observations which led to this line of investigation were: 1. The effect of abdominal distension, with ascites or meteorism. In the supine position the respiration is mainly diaphragmatic with epigastric protrusion. When distension is relieved, the respiration becomes mainly thoracic. 2. The contrast between the conditions present when the individual changes from a condition of standing slack to the upright. The change from standing slack to the upright posture is associated with a diminution of the epigastric propulsion, this indicating a diminution of excursion of the diaphragm. This alteration is accompanied by a change in the relationship of the sternum and front part of the chest to the spine.

Applied Anatomy.

The measurement from the spine of the twelfth dorsal or third lumbar vertebra to the articulation between the gladiolus and xiphisternum§ (the anteroposterior measurement) varies in the two postures. It is increased in practically every individual when changing from the slack to the upright to some extent. The actual difference, though not great, is of considerable importance, it varies from nothing to 2 cm., is least marked in those people of the pronounced abdominal or thoracic types of breathing, and more marked in the average individual, a combination of these two types. If an allowance of 3 in., or 7 cm. is deducted for the structures external to the diaphragm, the vertebra and sternum, &c., this will leave a measurement falling between 7·25 and 14 cm. for the distance between the inner surfaces of the vertebræ and the back of the sternum or seventh costal cartilage. Increasing that distance by a centimetre is adding to that distance an amount equal to 14 per cent. down to 7 per cent. The percentage when applied to the muscular part of the diaphragm is greater than the figures given, for no allowance has been made for the central tendon which should be credited with from 2 to 5 cm.

The movement of flexion and extension of the spine takes place chiefly in the lower dorsal and upper lumbar regions. The tendon of the crus of the diaphragm arises from the third lumbar vertebra; muscle-fibres of the crus arise from this tendon and also largely from the tendinous arch over the front of the aorta at the level of the twelfth dorsal vertebra.

§ This is a convenient point of measurement, as giving similar relationships to that between the vertebral points and seventh costal cartilage one and a half inches from its junction with the sternum, this latter being the point of attachment of the diaphragm muscle anteriorly, and nearest to the middle line.

It is in this mesial anteroposterior direction that the diaphragm is least curved, and is maintained in position of elevation by the right border of the pericardium, and also it is in this direction that the fibres stretching from the bony points to the central tendon are of shortest length. A considerable alteration in the stretch of the muscle-fibres is thus produced in the mesial anteroposterior portion of the diaphragm when changing from slack to upright. It was concluded from this observation that the effect of the change from the slack to the upright posture increased the stretch and therefore the contraction of the mesial anteroposterior portion of the diaphragm, and diminished the stretch on, and the contraction of, the remaining portion.

Experimental Confirmation.—This latter point—stretch in the dome of the diaphragm—is difficult to substantiate owing to the curved condition of the muscle, and it was speculative. Accordingly, in collaboration with Lady Briscoe,[16] the matter was investigated experimentally by her on the cat, and it was shown that the speculation was correct. A pneumothorax was made on one side and records taken from the crus, and from that part extending from the central tendon to the costal border in the midaxillary line, the dome.

It was found that in the ordinary experimental position the crus began to contract before the dome.* When the back of the animal was slightly overextended the contraction of the dome was diminished and retarded.* When the back was flexed the contraction of the crus was diminished while that of the dome was increased and appeared earlier.* In this position it was clearly seen that the dome was pushed up towards the head by the abdominal viscera.

Similar results were obtained by weak electrical stimulation of the phrenic nerve.

When the abdominal cavity was distended with saline, thus imitating the pathological condition arising in the presence of ascites, the animal being in the usual flat position, the dome was also pushed up and its contraction became bigger and was advanced relatively to the crus as the abdominal distension was increased.* These results could clearly be attributed to the stretch reaction.

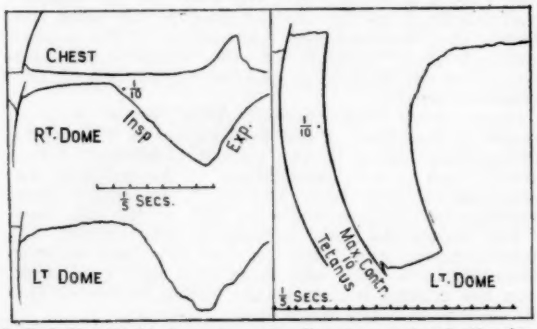
Importance of Stretch Reaction.—This demonstration is important as showing that the stretch reaction in the diaphragm is the same as that which occurs in a skeletal muscle. An increase of stretch causes: (1) an earlier contraction; (2) a stronger contraction in the muscle. It would thus appear to be a general reaction found in the heart, diaphragm, and skeletal muscles, and accordingly should also be applicable to the other muscles of respiration.

Importance of Strength of Stimulus.—The position arrived at, therefore, was that a stretch reaction explained this variation in the magnitude of the contraction in the diaphragm, that the same had been shown for heart muscle, and that Blix's law showed the same for ordinary skeletal muscle. Blix, however, had used maximal stimuli, and it remained to see whether the law still held with submaximal stimuli more akin to those which we believed to occur naturally. Accordingly the general question of the effect of increased stretch with weak stimuli was further investigated by Lady Briscoe[17] on the following lines: The gastrocnemius (rabbits and cats) and the sciatic nerve were exposed; no other dissection was made, except that the tendon of the muscle was attached to a recording lever; the muscle could thus be stretched or relaxed by simply altering the position of the foot. Weak break shocks were then sent in at regular intervals; it was found that the muscle, when put on the stretch, responded to stimuli which were ineffective when the muscle was relaxed.* This distinction failed when the sciatic nerve was severed from its connexion with the cord.

Objection might be made to the assumption that experimental stimuli are stronger than those which occur under ordinary circumstances in the body. To meet this objection it is necessary to produce a contraction artificially which should resemble that

which occurs under ordinary circumstances in the body, as opposed to the contraction produced by maximal stimuli. The diaphragm offers an ideal muscle for such an investigation because the normal respiratory movement of one half can be employed as a pattern to the result of artificial stimuli to the cut phrenic of the opposite side. A very presentable

FIG. 4.



Left half.—Right dome is responding to a natural stimulus. Left dome (paralysed, phrenic cut) responding to a graduated electrical stimulus. Natural contraction $1^3/_5$ second.
Right half.—Left dome response to maximal tetanising current. Maximal contraction attains in less than $^1/_5$ second a shortening three times greater than a normal contraction.

imitation of the normal movement has been obtained by Lady Briscoe [18] by the following means:—

The only dissection required is opening the abdomen to fix hooks on the under surface of the domes, and a dissection of the phrenic nerve on one side. The nerve is then tied off and cut and artificial stimuli applied in the following manner: The electrodes are placed and left in position. A faradic current used with a secondary coil which can be freely moved to increase and decrease the current is connected to the electrodes. The coil is placed so that a very weak current is passing through the nerve, but insufficient to produce any contraction. When the lever on the control side is seen to commence moving in inspiration the secondary coil is pushed up so as to increase the current. The lever on the experimental side then proceeds to move, and the tracing shows a graduated contraction of the experimental half of the diaphragm. This is in complete contrast to the contraction produced by a maximal single stimulus (Fig. 4). This is precipitate and considerably larger than the control side. When the contraction of the normal side has ceased and expiration is commencing the coil is gradually drawn down to its original position and produces a graduated relaxation. So far as I know this is the first successful demonstration of an imitation of a normal contraction and emphasises the submaximal character of normal stimuli and contractions.

Deduction.—Several points arise from this experimental work: (1) The nerve discharge in ordinary respiration is not as great as that evoked by the usual maximal stimulus. (2) The diaphragm is accordingly not forced into a maximal contraction. (3) The nerve discharge is one which waxes during an ordinary inspiration and wanes during expiration. (4) The influence of stretch is of paramount importance both in the selection of which muscle or part of the muscle shall contract, and in the degree of contraction, and in the time of commencement of the contraction.

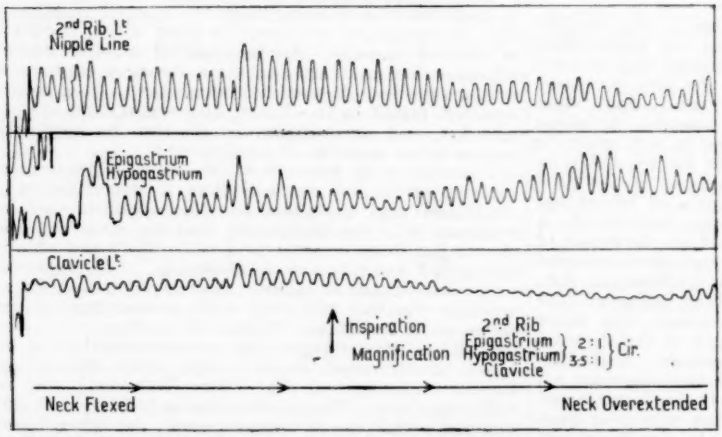
As a corrollary, when evaluating an increased movement in a tracing we must appreciate that there may be an underlying increase of stretch in the muscle or muscles.

THEORY BASED ON EXPERIMENTAL RESULTS.

If, then, we picture the crescendo of impulses descending the nerves which innervate the respiratory muscles of respiration, those muscles will contract first and most which are in the most suitable degree of stretch. If such contraction increases the stretch of other muscles, these will in turn contract, and the shower of impulses will continue until the respiratory centre has been satisfied and an adequate amount of air has entered the lungs. This will entail a certain expansion of the thoracic cavity. Such an expansion may occur through the action of the domes of the diaphragm or through the muscles which expand the bony thorax. Which of these two sets of muscles is ultimately in action will depend upon whether the domes of the diaphragm are in a greater degree of stretch than the remaining muscles of the thorax; if the dome is not in a suitable degree of stretch to pick up the stimuli these will then activate the muscles which operate on the chest wall. It will thus be seen that I am according the greatest function to the diaphragm, and consider that the chest is of secondary importance. This is supported by the fact that normally in practically every case the epigastric movement precedes the movement of any part of the thorax, though the relationships can be varied.

Similarly for expiration, if the natural forces of lung elasticity and gravity are insufficient, or muscular action is required, those expiratory muscles operating on the thorax under stretch will contract

FIG. 5.



To show the variation in contraction of the anterior scalene muscle as indicated by the clavicular movement. The neck passes from flexion to over extension passively. It shows (1) inverse relation of diaphragmatic and thoracic movement; (2) direct relationship of clavicular and costal movement; (3) optimum degree of clavicular and costal movements half way through the passive movement of the head. *Note.*—3·5:1 refers to clavicle only.

FIG. 6.

Top row: sections of diaphragm.
Lower row: length of muscle-fibre from attachment to insertion.
From left to right: (1) from a point half way between nipple and mid-sternal lines; (2) from mid-axillary line; (3) from posterior axillary line; (4) from the top of the twelfth rib; (5) from the crus.

Application of Theory to General Observations.

The same law of stretch explains the following phenomena observed clinically: 1. All conditions producing extension of the spine diminish the tension in the domes of the diaphragm and so increase the tendency to thoracic expansion by widening the intercostal space. Such are: (*a*) change from slack to upright by order, deliberately or subconsciously in anger, anxiety, &c.; (*b*) supine posture or reclining when the surface on which the back rests is flat.

2. All conditions increasing flexion of the spine increase the stretch in the domes and diminish the intercostal spaces and the tendency to thoracic expansion: (*a*) change from upright to slack; (*b*) reclining as in a hammock or similar arrangement. If the latter is pushed to the extreme the intercostals cease to contract at all and the spaces recede in inspiration.

3. Increased intra-abdominal pressure by gas or fluid will place the domes under stretch and promote contraction and diminish thoracic expansion.

4. With the back in a constant position, extension of the head increases the stretch of the anterior scalene, elevates the thorax, and produces an increased movement of the ribs (Fig. 5).

5. Lateral flexion of the spine increases the movement of the ribs on the convex side; the intercostal spaces are rendered wider and the muscles put on the stretch. Conversely on the concave side the spaces are narrowed, the muscular adjustment approximated, stretch is decreased, and the action diminished.

6. Elevation of the ribs by the intercostals increases the stretch on the transversalis, triangularis, and lateral abdominal muscles, and renders them receptive to expiratory impulses.

7. When these muscles contract in inspiration, and pull down the lower ribs, the lower intercostals are stretched and contract in expiration.

8. In the analysis of tracings of respiratory movements I find that the larger the contraction the earlier it appears to commence (Fig. 6).

The construction of the diaphragm is in accord with this theory, for where the shorter length of muscle from origin to insertion is found, there is the greater mass of muscle-fibres.* This is an optimum condition for efficiency on the basis of the stretch reaction.¶

SUMMARY.

The question of stretch then governs the order in which muscles will contract and the power they will put into that contraction. The diaphragm is almost the only respiratory muscle worth considering in quiet breathing in animals, and remains the most important in man, though in him it has lost some mechanical efficiency through his orthograde habit. Man is forced to compensate for this relative deficiency of the diaphragm by a greater use of other muscles, these other muscles acting either by active contraction or by persistent tonus of postural type. If exaggerated these actions are not a normal use of muscle but an abnormal over-use, and in consequence a possible source of trouble.

(*The bibliography, to which references are given in this lecture, will appear with the third lecture.*)

¶ As a corollary, the varying length of muscle-fibre must lead to variations in stretch effect; the longer fibres will be the least influenced by a given stretch. The longest fibres of the diaphragm are those which originate in the axillary area, where also the bulk of muscle is least. I therefore think that these are the last of the diaphragm fibres to come into contraction, and the first to fail to contract. Such a conception is suggestive in relation to physical signs—e.g., of pleural effusion.

NEW HULL INFIRMARY.—Plans have been completed for the erection of a new infirmary with 500 beds at Sutton, East Yorkshire, on a site of 50 acres, given by Mr. Phillip Reckitt. The cost will be about £15,000.

LIVERPOOL HEART HOSPITAL.—Good progress during its first year was reported at the annual meeting. There are at present only 17 beds, but the committee are anxious to open three more wards of 12 beds each.

Goulstonian Lectures

ON

CARDIAC DYSPNŒA.

The Third Goulstonian Lecture in 1927, delivered before the Royal College of Physicians of London on March 17th

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LECTURE III.*

CAUSES OF THE INCREASED VENTILATION.

THE results of the examination of the arterial blood in these cases agree in general with those of other observers. In spite of using venous blood for the construction of the dissociation curve and so obtaining values for the carbon dioxide pressure that may err on the high side, Campbell, Hunt, and Poulton [20] found that while some cases of mitral stenosis with dyspnœa had low arterial carbon dioxide values, others had raised values with a fall in oxygen saturation. They found the carbon dioxide combining power about the lower limit of the normal, and the hydrogen-ion concentration within normal limits. The patients with arterial disease and myocardial degeneration investigated by them had more pronounced pulmonary complications than those in this series, and their findings in them were similar to those in the third group in this series. Peters and Barr [21] considered a carbon dioxide acidosis to be the cause of cardiac dyspnœa, but base their opinion on dissociation curves constructed with venous blood. Peters [26] found the alveolar carbon dioxide pressure to be low in comparison with the capacity of the venous plasma, and presumed that the hydrogen-ion concentration of the blood was raised. Peters and Barr,[21] and Campbell, Hunt, and Poulton [20] found that the carbon dioxide pressure in the arterial blood is higher than that in the alveolar air in severe failure. Several writers have reported on the arterial carbon dioxide content and on the capacity or combining power in heart failure, notably Harrop,[18] Barach and Woodwell,[19] and Meakins and Davies.[2] In general they find low arterial carbon dioxide contents and normal or low normal capacities, except in severe congestive failure, more especially in cases of myocardial degeneration, when high arterial carbon dioxide contents appear to be the rule. There are no reliable figures in the literature for the hydrogen-ion concentration obtained by direct observation on the arterial blood and the calculated values are unreliable, since they are calculated on pressure values obtained from curves constructed with venous blood. The colorimetric method used in this series is not reliable, in that the factors that may be present in disease and may give rise to error are not yet known, but it gives values independent of the carbon dioxide determinations that have at least a comparative value in repeated observations on a single case. Lewis and Barcroft [39] estimated the reduction in "alkalinity" or the excessive amount of fixed acid present by the oxygen saturation of the blood at 17 mm. pressure of that gas. They found some degree of acidosis to be common in the cardiac dyspnœa of elderly or middle-aged patients, and to be especially common in terminal heart failure. Such a condition was well seen in Case 10 in this series. The readjustment of base that takes place in the presence of low carbon dioxide tensions, so that the carbon dioxide capacity or combining power is lowered, would account in a further number of their cases for the apparent "acidosis" obtained by their methods. All these results by other observers are compatible with the results in this series, when it

* Lectures I. and II. appeared in THE LANCET of March 12th and 19th respectively.

is seen that the condition of the patient at the time of the observation may determine whether a low carbon dioxide pressure is found, or a raised pressure due to the œdema and other changes in the lungs that occur in the very advanced stage of failure. The important cases from the point of view of determining the essential factors in the dyspnœa are the younger ones, who are less likely to have disturbances due to arterial and renal disease or to pulmonary disease in addition to heart failure.

The stimulus to the respiratory centre, though independent of the quality of the arterial blood, may be the result of circulatory disturbances at the centre. In heart failure the altered conditions of the circulation can result conceivably in changes in the tissues in two ways. Slowing of the circulation so that the tissues receive less arterial blood may result in (*a*) a deficient supply of oxygen to the respiratory centre even though the blood contains a normal quantity of oxygen, and may result in (*b*) a raised carbon dioxide content and pressure in the venous and capillary blood, so that the tissues of the centre are exposed to a raised carbon dioxide pressure and increased hydrogen-ion concentration.

The methods available for the estimation of the blood flow per minute are not yet suitable for the investigation of severely dyspnœic patients. By practice, however, suitable patients can be trained to coöperate so that results of value are obtained. The most satisfactory methods depend essentially on the estimation of the carbon dioxide pressure in the mixed venous blood from the pressure in the alveolar air when equilibrium with the blood in the lungs is established. In practice this is a difficult procedure in a dyspnœic patient. Barcroft, Bock, and Roughton [40] found a reduction in the minute volume of more than 50 per cent. to occur in a case of paroxysmal tachycardia during the tachycardia. Dautrebande, Fetter, and Meakins [22] found a similar reduction in a case of auricular fibrillation and mitral stenosis during an attack of severe tachycardia. Meakins and Davies [2] found in two cases of auricular flutter that the minute volume was reduced when the ventricular rate was increased. In cases of mitral stenosis in which clinical evidence pointed to a considerable degree of stenosis the circulation rate was diminished. In two cases of syphilitic disease of the aorta with aortic regurgitation the minute volume was greatly reduced with the onset of congestive failure. In one case of myocardial degeneration, an increase in the degree of failure was accompanied by a greatly reduced minute volume. These results are sufficient to support the view that cardiac disability sufficient to produce dyspnœa at rest is accompanied by a reduction in the minute volume, and indicate that this reduction may be as much as 50 per cent. or more.

Peabody, Meyer, and Du Bois [41] have estimated the metabolism in cases of cardiac insufficiency with dyspnœa, and find that it is increased over the normal and that the increase may be as great as 25–50 per cent. Their results have been confirmed by Hamburger and Lev,[42] and by Shapiro.[43] Eppinger, Papp, and Schwarz [23] estimated the difference in the oxygen content of the arterial blood and of the blood from the arm veins in normal subjects and in cases of different types of dyspnœa. In cases of heart failure with valvular disease they found a pronounced increase in the amount of oxygen extracted by the tissues from a given volume of blood in the majority of cases. This increased utilisation was more marked in cases of mitral valve disease than in cases of aortic valve disease. They point out that blood from the arm veins does not necessarily give a true indication of the general circulation. In cases of dyspnœa with high blood pressure and heart failure they did not find evidence of increased utilisation.

In cases of heart failure, therefore, such as those we have investigated, there is evidence to show that there is a raised metabolism and at the same time a diminished blood-supply to the tissues. This condition will result in an increased utilisation of the oxygen in the arterial blood by the tissues. From the shape of the dissociation curve of oxyhæmoglobin,[26] the increased volume of oxygen that the blood gives up in its passage through the tissues must be supplied at a mean pressure that is lower than normal. Since, presumably, the tissues of the respiratory centre will be affected in common with the other tissues of the body, the centre also will receive its oxygen at a lowered pressure. The centre will thus be stimulated and hyperpnœa will result. At the same time the venous blood must be carrying an increased load of carbon dioxide, and the carbon dioxide pressure in the venous and in the capillary blood will be increased. The reduction in the carbon dioxide pressure in the arterial blood in consequence of the increased ventilation due to the oxygen deficiency will to some extent compensate for this, as Pearce [44] has shown. In cases with unhampered ventilation and efficient gaseous exchange this compensation may be sufficient, but in cases with pulmonary disease or with severe secondary changes in the lungs, there will probably be an additional stimulus to the centre in the raised carbon dioxide pressure at the centre. If this was a constant factor in cardiac dyspnœa, one would expect, from the observations of Henderson and Haggard,[13] that the carbon dioxide capacities would be high, at any rate in young subjects without evidence of renal disease and in the less severe stages of failure. In this series a raised carbon dioxide pressure in the arterial blood in young subjects is accompanied by a raised combining power or capacity (see Cases 5 and 17), but many of our cases of cardiac dyspnœa in otherwise comparable subjects have low capacities. It is unlikely, therefore, that in them there is a raised carbon dioxide pressure in the tissues.

Conclusions on Increased Ventilation.

It appears, therefore, that (1) one constant stimulus to the respiratory centre in cardiac dyspnœa to produce increased ventilation is a deficient supply of oxygen, due to a diminished blood-supply to the centre; (2) in cases with pulmonary disease in addition, and cases of severe failure with pronounced secondary changes in the lungs, raised carbon dioxide pressure and increased hydrogen-ion concentration will act as an additional stimulus; and (3) in cases near death or in very advanced conditions of failure the retention of non-volatile acid substances will result in an increased hydrogen-ion concentration that will act as an additional stimulus. In some cases under (2) and (3) a low oxygen saturation in the arterial blood may be present, and this will be a further factor in the stimulation of the centre.

RESPIRATORY DISTRESS.

In any explanation of cardiac dyspnœa it is not sufficient to show that the respiratory centre is stimulated, and that in uncomplicated cases the study of the arterial blood shows that there is hyperpnœa and increased ventilation. To account for the dyspnœa it is necessary to show that the need for increased ventilation is greater than the pulmonary apparatus can meet easily and without the respiratory action entering the field of consciousness and so producing distress. The factors that may interfere with efficient pulmonary ventilation have been fully discussed by Means[1] and Meakins and Davies.[2]

Vital Capacity.

In quiet, healthy breathing the amount of air that is inspired and expired at each respiratory cycle is about 500 c.cm. This is called the tidal air. The amount that can be forcibly expired after a forced inspiration is between four and five litres. This is called the vital capacity, and is divided into the complemental air which is the amount that can be forcibly inspired from the mid-position, and the reserve air or the amount that can be forcibly expired from the mid-position. After a forcible expiration there is still a considerable volume of air in the lungs, called the residual air. The tidal air can be greatly increased without dyspnœa arising, and Peabody [45] showed that if hyperpnœa is induced by breathing

increasing concentrations of carbon dioxide, the tidal air may be increased 400 per cent. before distress becomes marked. The actual increase before the onset of distress varies considerably with individuals. Means and Balboni [46] showed that if the vital capacity is reduced by half in artificial pneumothorax, the tidal air increases with increasing concentrations of carbon dioxide as in the normal, but that dyspnœa appears much earlier. It is evident, then, that the relation of tidal air to vital capacity is important in determining the onset of dyspnœa. Vital capacities in healthy individuals have been carefully studied, and Dreyer's [47] conclusion that it is a simple function of the area of the body surface is generally accepted. The vital capacity in cases of congestive heart failure has been studied by Siebeck,[48] by Bittorf and Forschbach,[49] and by Peabody and Wentworth.[50] They find a very constant reduction in vital capacity, which may be as low as one litre. Further, Peabody and Wentworth followed cases from stages of severe failure to those of comparative recovery, and found that as recovery occurred the vital capacity rose. The reduction of vital capacity affects the reserve air more than the complemental. To ascertain the cause of the reduced vital capacity, Drinker, Peabody, and Blumgart [51] carried out animal experiments. They concluded that the loss of elasticity of the lungs that results from congestion is the main factor, and that the greater the pressure in the pulmonary circuit the less the vital capacity. They point out that the actual enlargement of the heart and the increased quantity of blood in the pulmonary vessels must reduce somewhat the air-containing space in the thorax. The onset of œdema of the lungs and of fluid in the pleural cavities, as extreme failure sets in, will still further reduce the vital capacity. That a reduction in vital capacity is an essential factor in the production of cardiac dyspnœa is supported by the examination of the arterial blood in two cases of active heart disease who were without any respiratory distress when lying flat in bed. Case 20, aged 38, had subacute bacterial endocarditis with aortic regurgitation and mitral valve disease. The heart was dilated, and there was œdema of the legs and a few râles at the bases of the lungs. Case 21 had active rheumatic carditis with aortic regurgitation and mitral disease, and the heart was dilated. The results of the examination in these cases are shown in Table VIII. The normal oxygen saturation, low

TABLE VIII.

Result of examination of arterial blood in two cases of acute valvular disease without evidence of dyspnœa or heart failure at rest.

Case No.	Age.	Date in 1924.	Dyspnœa at rest.	Arterial blood.					
				O_2 capacity.	O_2 saturation.	CO_2 content.	CO_2 capacity at 40 mm. Hg.	CO_2 pressure from dissociation curve.	pH calculated.
				V.%	%	V.%	V.%	mm.	
20	38	30/6	Nil.	17·7	100	36·7	42	28	7·42
21	16	14/4	Nil.	14·8	97	40·0	43	29	7·44

V.% = Volumes per cent.

carbon dioxide tension, and volumes with low normal capacities, and values for the calculated pH in the alkaline half of the normal range are similar to those found in the younger patients with mitral stenosis and auricular fibrillation and severe dyspnœa. The character of the arterial blood indicates increased ventilation, therefore, in both the dyspnœic patients and in Cases 20 and 21. The patients with dyspnœa differed from those two cases, apart from the presence of respiratory distress, in that they had a high colour and more or less cyanosis indicative of some degree of venous engorgement. It is probable, therefore, that the incidence of the dyspnœa was determined by the reduction of vital capacity due to pulmonary vascular engorgement. The mechanism of heart failure in cases of mitral stenosis differs from that in cases of high blood pressure and myocardial degeneration in that pulmonary engorgement occurs at a much earlier stage in the failure, and this has most likely a causal relationship with the early incidence of dyspnœa in mitral stenosis, and its later incidence in cases of myocardial degeneration and high blood pressure when the stage of advanced failure is reached. It would appear, therefore, that the effort necessary to effect the required ventilation in the presence of the reduced vital capacity is a factor in bringing the respiratory act into the field of consciousness and producing distress.

Shallow Breathing.

The type of breathing in cardiac dyspnœa is rapid and shallow as a rule. The chemical stimuli at the centre regulate the amount of alveolar ventilation, and when it is considered that the presence of a considerable dead space in the upper respiratory passages and bronchial tree must result in waste each time this space is filled and emptied, it is obvious that the deeper and fewer the respiratory movements are the more economical they will be in establishing the required ventilation. The type of breathing is normally regulated by the Hering-Breuer reflex. Afferent stimuli from the lungs are conveyed to the centre by the vagus nerves, so that when inspiration has proceeded to a certain extent, the inspiratory movement is inhibited and expiration takes place. Means [1] considers that the respiratory centre and the vagus inhibition are so regulated in health that a happy medium exists between slow deep breathing and rapid shallow breathing. Slower and deeper breathing would involve active respiratory efforts to expel some of the reserve air, and so lead to greater exertion than is necessary when normal tidal respiration with its passive expiratory phase is occurring, while shallower respiration by increasing the importance of the dead space would cause more rapid breathing and augment the work of the respiratory musculature in effecting the necessary alveolar ventilation. It is conceivable that some exaggeration of the vagus inhibition relative to the activity of the respiratory centre can bring about the shallow rapid form of breathing seen in cardiac dyspnœa. Haldane, Meakins, and Priestley [5] showed that shallow and correspondingly frequent breathing resulted from long continued oxygen want, and considered it due to fatigue of the centre. Davies, Haldane, and Priestley,[52] showed that this type of breathing resulted as a response to excessive and prolonged resistance. The rapid and shallow character of the breathing in cardiac dyspnœa may be the result, then, of fatigue of the centre and a relative exaggeration of the vagus inhibition of the inspiratory act, but the appearance of this character comparatively early in the course of mitral stenosis points to the mechanical limitation of expansion and reduction of vital capacity consequent on the vascular engorgement as the more important factor. In the later stages of failure gross œdema of the lungs will still further limit the depth of breathing, and the fatigue of the centre, due to anoxæmia and increased resistance, must undoubtedly add its effect. That shallow breathing can cause anoxæmia has been demonstrated by Haldane, Meakins, and Priestley.[53] A vicious circle will thus be established, and a dangerous and urgent stage of failure will be reached. The rapidity of the breathing that accompanies the shallowness in order to effect the necessary ventilation is probably a factor in causing consciousness of the respiratory movements and distress.

Conclusions on Respiratory Distress.

The slow circulation rate of heart failure which results in a stimulus at the centre for increased ventilation, results, therefore, at the same time in reduction of vital capacity by engorgement of the pulmonary circulation and in fatigue of the

respiratory centre, so that the need for increased ventilation cannot be met without consciousness of the respiratory movements. This produces distress or dyspnœa.

ORTHOPNŒA.

In all the cases of cardiac dyspnœa studied by us orthopnœa was present as well. There is evidence to show that this also is closely related to reduced vital capacity. Christie and Beams [54] have shown that orthponcœa only occurs when the vital capacity is reduced. Haldane, Meakins, and Priestley [5] believe that the fan-like expansion of the lung is less efficiently carried out in the lying than in the upright posture, and showed that constriction of the abdomen and thorax so as to limit the inspiratory movement caused less discomfort in the upright than in the lying posture. If the breathing is of the rapid shallow type from respiratory fatigue, anoxæmia results more readily in the recumbent than in the upright posture. The suggested explanation for the dyspnœa, therefore, accounts also for the orthopnœa.

PERIODIC BREATHING.

In two cases in this series Cheyne-Stokes' breathing occurred. In Case 10 (see Tables III. and VI.) no periodicity was observable at the time of the first observation, but was obvious on the previous day. In Case 12 the periodicity was so pronounced at the first observation that the blood was obtained entirely during a period of hyperpnœa. At the second observation it was still present, but was much less pronounced, and the time during which the arterial blood sample was withdrawn included both the phase of hyperpnœa and the phase of reduced respiratory movements. The work of Douglas and Haldane,[55] and of Pembrey and Allen,[56] has demonstrated conclusively that this type of breathing is due to oxygen want at the respiratory centre. The centre, therefore, functions about a lowered threshold of carbon dioxide pressure.[4] Our results are quite compatible with this view, as the examination of the arterial blood shows merely the effects of hyperpnœa not due to oxygen unsaturation or carbon dioxide excess in the arterial blood. Clinically, periodic breathing is rarely observed in cases of heart failure with marked stasis and venous congestion in which pulmonary ventilation is mechanically hampered, and is found most commonly in cases of arterio-sclerosis or of raised intracranial pressure before the late congestive stage of failure is reached. The precise relations of the circulation at the centre, and the oxygen and carbon dioxide pressures necessary to produce this rather uncommon respiratory disorder are still undecided. To account for the peculiar features of this type of respiration, for the experimental observations, and for its clinical incidence, it would appear that two conditions must be satisfied: (1) the respiratory centre because of oxygen lack must be functioning about a lower threshold of carbon dioxide and hydrogen-ion concentration than normal and more sensitive than normal to variations in these factors; and (2) the pulmonary apparatus must be capable of considerable increase in alveolar ventilation, permitting the carbon dioxide pressure in the arterial blood to be readily lowered, and the carbon dioxide pressure at the centre to undergo considerable variations.

PAROXYSMAL DYSPNŒA.

Cases 9, 11, and 16 in the present series were liable to attacks of paroxysmal dyspnœa of the type known as cardiac asthma. At the second observation on Case 9 the arterial blood was taken during such an attack, but as the attack occurred at the onset of erysipelas which proved fatal, and at the time of the rapidly increasing fever of onset, the results cannot be regarded as typical. In the other cases the observations were not made at the time of the paroxysms. The recent work of Eppinger, Papp, and Schwarz,[23] on the condition of the circulation during attacks of cardiac asthma, and after relief by means of morphia, are of great interest and importance. They employed several methods for estimating the circulation rate, and came to the conclusion that in a number of cases the minute volume of the circulation is increased above the normal during the paroxysm, and that it becomes less in recovery after the use of morphia. This is a surprising observation and deserves careful consideration. Paroxysms of cardiac asthma are accompanied by great distress and violent respiratory efforts. Râles of pulmonary œdema are present and increase in number as the paroxysm continues, and the patient becomes cyanosed and may die. Morphia stops the attacks and the râles diminish and disappear as the dyspnœa lessens. Since cardiac asthma is not seen commonly in heart failure, there must be some causal factor in addition to the presence of heart failure with a slow general circulation rate, and in view of the findings of Eppinger, Papp, and Schwarz that the paroxysms continue in spite of a raised circulation rate, this causal factor must be independent of the general circulation rate. Hofbauer [57] has suggested that local spasm of the arteries supplying the respiratory centre is the cause of the paroxysm, and quotes the frequency of arterial spasm in cases of cardiorenal disease in which this type of dyspnœa is most commonly seen, in support of the hypothesis. The increasing cyanosis, the increasing pulmonary congestion, the raised circulation rate and the improvement after morphia, are not explained by this hypothesis. Blalock, Harrison, and Wilson [33] have shown experimentally that in morphinised dogs obstruction to the respiration sufficient to produce anoxæmia caused the minute volume of the circulation to be much increased. Harrison and Blalock [58] showed that in dogs trained so that the use of morphia was unnecessary, severe anoxæmia produced by breathing air poor in oxygen was accompanied by an increased cardiac output. Huggett,[59] working with cats, found that obstruction to inspiration caused an increase in minute volume and stroke volume of the circulation, but that obstruction to expiration caused a diminution. These experimental results suggest that inspiratory efforts in the presence of mechanical difficulties in the carrying out of the inspiratory act result in an increased blood flow to the heart through the action of the respiratory pump. A flow of blood to the right heart and thence to the pulmonary circulation that is too great for the left ventricle to handle will result in an increased circulation rate and in increasing œdema of the lungs. So long, therefore, as inspiratory effort and inspiratory difficulty continue in a case in which the left ventricle is working nearer the limit of its capacity than the right, increasing pulmonary œdema may be brought about. The type of case in which cardiac asthma occurs is usually the cardiorenal or arterio-sclerotic, with signs of heart failure; and in this type the main stress falls on the left ventricle. Whether the onset of the paroxysm is due to local vascular constriction at the centre, or whether it is due to the development of congestion and œdema of the bases of the lungs from the recumbent posture of the patient, or from the lack of conscious respiratory effort during sleep, or whether it is due to some sudden disablement of the left ventricle, such as coronary thrombosis or an abnormal rhythm, is uncertain. Any of these possible causes of the onset of vigorous respiratory efforts will result, first, in the circulation rate being raised to the extent that the left ventricle is capable of, and then, if the left ventricle was previously working nearer to its maximum capacity than the right, in pulmonary œdema.

If this is the explanation of the features of cardiac asthma, the relief obtained by morphia and the accompanying slowing of the circulation rate, noted by Eppinger, Papp, and Schwarz, are understandable. Morphia acts on the respiratory centre to depress it, and will check the inspiratory efforts so that the blood flow to the heart is lessened, and the muscle of the left ventricle will have a chance to recover sufficiently to re-establish the balance between right and left ventricular output and to remove the immediate and urgent danger.

Dyspnœa Possibly a Dangerous Reaction.

The analysis of the different types of dyspnœa in heart failure points to the conclusion that, although the increased ventilation is of service to the body in that it tends to correct oxygen lack in the tissues and to restore carbon dioxide pressure and hydrogen-ion concentration in the tissues to normal values if these also are disturbed, respiratory efforts in the presence of resistance to the inspiratory expansion will be a source of urgent danger if the left ventricle is already working near its maximum capacity. Severe dyspnœa with increasing pulmonary œdema should, therefore, be immediately checked by the use of morphia. It is probable, as Wilson [60] has suggested, that in many cases with less urgent indications the use of morphia would be of more value than is usually realised. It has, however, serious drawbacks. The increased ventilation will be checked, and the oxygen saturation of the arterial blood may thus be diminished and the tissue anoxæmia increased, or the carbon dioxide pressure and hydrogen-ion concentration of the arterial blood and of the tissues may be unduly raised. These dangers were seen in Case 15, in which morphia was administered on two occasions. Table IX. shows the results of

TABLE IX.

Effect of morphia on the dyspnœa and the characters of the arterial blood in Case 15.

Date in 1926.	Morphia.	Dyspnœa.	Arterial blood.					
			O_2 saturation.	CO_2 content.	CO_2 pressure.		pH.	
					From dissociation curve.	From pH pressure curve.	Colorimetric.	Calculated.
			%	V. %	mm	mm.		
15/2	Before.	+ + +	100	47·8	54	49	7·42	7·23*
	½ hour after gr. 1/8.	—	80	50·8	60	56	7·37	7·20
22/2	Before.	+	96	50·5	48	41	7·40	7·27
	½ hour after gr. 1/16.	Sl.	95	52·8	50	45	7·42	7·27

* Figures uncertain since that for CO_2 pressure was obtained by extrapolation. Sl. = Slight.

the examination of the arterial blood before and after the administration of the morphia. On the first occasion an eighth of a grain was given, and the oxygen saturation dropped from 100 per cent. to 80 per cent., and the carbon dioxide content and pressure rose, while the patient experienced great relief and showed no apparent ill-effects of the anoxæmia. On the second occasion the dyspnœa was less, and a sixteenth of a grain was given. There was again considerable relief, but less striking than on the previous occasion, and the arterial blood showed no significant changes. Anoxæmia to the extent seen in this case after an eighth of a grain of morphia might well be fatal if the centres were already fatigued, and much caution is necessary before deciding to check dyspnœa in this way. Such a procedure would have a more general application if oxygen could at the same time be effectively introduced and supplied to the tissues. The present methods of oxygen therapy are not satisfactory, and more efficient and practical methods of administration are urgently needed. Such methods would be of inestimable value in permitting an extension of the use of morphia in the treatment of heart failure.

Whatever may be the value of treatment directed to the removal of a dangerous reaction, the basic fault in all forms of cardiac dyspnœa, as this analysis has shown and as Means [1] and Meakins and Davies [2] point out, is the inefficiency of the heart muscle, and treatment must be directed primarily to improving the efficiency of the myocardium and to diminishing the work that it is called upon to perform.

SUMMARY AND CONCLUSIONS.

1. The study of the arterial blood in cases of cardiac dyspnœa shows the presence of factors producing increased ventilation or hyperpnœa, and indicates that: (1) The one constant stimulus to the respiratory centre in cardiac dyspnœa to produce increased ventilation is a deficient supply of oxygen, due to a diminished blood-supply to the centre. (2) In cases with pulmonary disease in addition, and cases of severe failure with pronounced secondary changes in the lungs, raised carbon dioxide pressure and increased hydrogen-ion concentration will act as an additional stimulus. (3) In cases near death, or in very advanced conditions of failure, the retention of non-volatile acid substance will result in an increased hydrogen-ion concentration that will act as an additional stimulus. (4) In some cases under (2) and (3) a low oxygen saturation of the arterial blood may be present, and this will be a further factor in the stimulation of the centre.

2. There is evidence that the slow circulation rate of heart failure which results in the stimulus at the centre to produce increased ventilation, results at the same time in reduction of vital capacity by engorgement of the pulmonary circulation and in fatigue of the centre, so that the need for increased ventilation cannot be met without consciousness of the respiratory movements. This produces the distress or dyspnœa.

3. The clinical features and experimental observations on orthopnœa, periodic breathing, and paroxysmal dyspnœa (or cardiac asthma) are compatible with these conceptions of cardiac dyspnœa.

4. Dyspnœa may be a dangerous reaction, and in certain cases the direct treatment of it by means of morphia is indicated, but full use of this action of morphia cannot be attained until practical methods of administering oxygen are further developed.

5. The fundamental cause of cardiac dyspnœa is inefficiency of the myocardium.

In conclusion, I should like to express my indebtedness to the skill and coöperation of my colleagues, whose work has given me the opportunity of carrying out this analysis and discussion.

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SANOCRYSIN IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

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FOLLOWING Prof. Mollgaard's discovery three years ago,[1] that sanocrysin, when given sufficiently early and in adequate amount, exercises a strikingly beneficial effect on tuberculous lesions in calves, there has been a large amount of work in the clinical field, and although the results of this have not been uniform, there is much evidence to show that in this salt of gold we have a drug with a definitely specific action on the tuberculous process.

The great majority of cases on which this article is based had failed to give satisfactory response to sanatorium treatment; the prognosis was at best doubtful and in several cases definitely bad. It is too early to say how far the ultimate prognosis has been affected by the sanocrysin treatment, but in a number of cases febrile, sputum positive, more or less bedridden patients have changed during or following the course of injections into afebrile, sputum negative, ambulant cases. After a certain number of weeks or months there is a tendency for the sputum to become positive again, and, less commonly, for the temperature to rise; a second course of injections usually results in these symptoms disappearing again.

Selection of Cases.

Since fibrous tissue hampers the action of a drug circulating in the blood stream, cases of long-standing phthisis with cavities and much fibrosis cannot be expected to do as well as those in which the disease is early and the tuberculous infiltration soft and in close contact with the blood capillaries. The first cases chosen were, therefore, chiefly of the latter type. As some of these gave strikingly good results there was a general demand for the treatment among their fellow patients, and recently a number of less suitable cases have been treated and we have found that even in disease of many years' duration marked improvement may occur. In two cases in the last stages of cachexia and emaciation sanocrysin was tried at the request of the patient and relatives; but it was not found possible in either case to maintain a sufficient dosage to have any lasting effect. The most severe case to have a good result differed from these in that he was gaining weight at the time sanocrysin was started; he lost seven pounds during the following six weeks. This question of emaciation is most important in the selection of cases as, unless the patient is thought fit to stand the loss of several pounds, it will probably be found necessary to abandon treatment with the disease still active and the patient even more emaciated than at the beginning of treatment.

[1] Mollgaard: Chemotherapy of Tuberculosis, 1924.

Artificial Pneumothorax and Sanocrysin.

As Gravesen has already observed,[2] there are many cases in which collapse treatment may with advantage be combined with sanocrysin. A typical example of this was seen in a case in which recent disease in the uncollapsed lung became inactive after a few weeks' gold treatment. In another case a pneumothorax which had successfully controlled activity for some months obliterated gradually after pleural effusion. The first stage of this process resulted in the re-expansion of the whole lung with the exception of the apex; activity, manifested by fever, positive sputum, and coarse râles returned, but was temporarily checked by a course of sanocrysin. Several weeks later the apex, which contained a large cavity, re-expanded and the symptoms of activity returned, but disappeared again with a second course of gold. This patient has been free from active symptoms for three months.

Dosage.

No hard-and-fast rules can be laid down as to the dosage. Careful individualisation will give better results than any rigid system. In the early days of sanocrysin large doses at short intervals were given from the beginning of treatment[3]; severe shock and sometimes fatal reactions resulted and the method was looked on by many as a "kill or cure" treatment. Our experience suggests that equally good results can be obtained without exposing the patient to such dangers. The aim of the treatment should be to obtain an effective concentration of the drug in the body without, in so doing, producing reactions so severe as to endanger life or reduce the resistance to the disease. In our cases the initial dose has varied between 0·025 g. in an emaciated subject with advanced disease and 0·35 g. in an ambulant case. In the former it was 40 days before a dose of 0·75 g. could be given, while in the latter 0·6 g. was given on the second day and 0·85 g. on the fifth. As a general rule, 0·85 g. to 1 g. has been considered a full dose for adult males. In females it is often better not to give more than 0·75 to 0·85 g.

[2] Sanocrysin in the Treatment of Pulmonary Tuberculosis, Acta Tub. Scand., vol. i., Fasc. 4, 1925.
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CLASS I.—*Improvement Considered Due in Part at Least to Sanocrysin.*

Case No.	Before sanocrysin.		After first course of sanocrysin.		Subsequent history.		Remarks.
	Degrees of temp. (average).	Sputum.	Degrees of temp. (average).	Sputum.	Degrees of temp. (average).	Sputum.	
	A.M. P.M.		A.M. P.M.		A.M. P.M.		
1	98·4 .. 100·2 In bed.	T.B. +	97·6 .. 98·7 Wk. 2 m.	T.B. − Soon nil.	97·7 .. 98·7	T.B. +	Wk. 6 m.
2	99·2 .. 101·0 In bed.	T.B. +	97·6 .. 98·4	T.B. −	97·6 .. 98·2	None.	Wk. 8 m. Skating.
3	98·2 .. 99·6 In bed.	None.	97·3 .. 98·3 Wk. 2 m.	None.	97·8 .. 98·3	None.	Wk. 6 m.
4	99·5 .. 99·7 In bed.	T.B. +	97·8 .. 98·3 Wk. 2 m.	T.B. −	97·2 .. 98·2	T.B. + for a time. Now −.	Right arterial pneumothorax. Sanocrysin given for recent spread in left lung. Wk. 6 m.
5	99·2 .. 101·2 In bed.	T.B. +	99·0 .. 100·0 In bed.	None.	— —	—	Right spontaneous pneumothorax. Bronchial fistula. Severe disease in left lung.
6	97·3 .. 98·4	T.B. +	97·1 .. 98·3	T.B. −	97·2 .. 98·2	None.	Wk. 10 m.
7	99·0 .. 99·4 Up; not wk.	T.B. +	98·2 .. 98·4 Wk. 1 m.	T.B. −	— —	T.B. +	—
8	98·2 .. 99·0 In bed.	T.B. +	98·2 .. 98·6 Wk. 2 m.	T.B. −	98·0 .. 98·3	Practically none.	At home; much improved. Wk. 6 m. T.B. larynx healed.
9	98·0 .. 99·2 In bed.	T.B. +	97·8 .. 98·4 Wk. 2 m.	T.B. −	97·8 .. 98·4	T.B. + for a time. Now −.	Wk. 6 m.
10	98·8 .. 99·8	T.B. +	98·8 .. 99·4	T.B. −	97·8 .. 98·6	None.	Wk. 2 m.
11	99·0 .. 100·0	T.B. + for 8 yrs.	98·2 .. 98·4 Wk. 2 m.	T.B. −	98·0 .. 98·6	T.B. −	Sputum T.B. + for short time before second course of sanocrysin.
12	97·0 .. 98·4 Wk. 6 m.	T.B. +	97·0 .. 98·1 Wk. 10 m.	T.B. −	— —	—	At work since September.
13	98·8 .. 100·2	T.B. +	98·3 .. 99·0 Wk. 1 m.	T.B. −	— —	T.B. + for a time. Now −.	—
14	98·0 .. 100·0 In bed 12 mths.	T.B. +	98·4 .. 99·3 In bed.	T.B. +	— —	—	—
15	98·0 .. 99·0 In bed.	T.B. +	98·0 .. 99·0	T.B. −	98·0 .. 99·0	T.B. +, then no sputum.	Left arterial pneumothorax. Lung expanded after pleural effusion.
16	98·8 .. 100·0 In bed.	T.B. +	98·0 .. 99·0 Up.	T.B. −	98·0 .. 98·8	T.B. + for a time. Now −.	—
17	98·7 .. 99·2 In bed.	T.B. −	98·7 .. 99·2 In bed.	T.B. −	98·0 .. 98·6	T.B. −	At home; improved. Recently had second course. Wk. 4–5 m.

CLASS II.—*Improved, but Doubtful if Due to Sanocrysin.*

	A.M. P.M.		A.M. P.M.		A.M. P.M.		
18	9·77 .. 98·6 Wk. 2 m.	T.B. +	97·7 .. 98·3 Wk. 2 m.	T.B. +	— —	—	At work since July, 1926.
19	98·8 .. 99·7 In bed.	None.	98·4 .. 99·2 Up; not wk.	None.	— —	None.	At home; improved. Recently had hysterectomy.
20	99·8 .. 100·0 In bed.	T.B. +	99·0 .. 99·5 In bed.	T.B. −	— —	—	Wk. until recently, when had phrenic avulsion.
21	98·4 .. 99·5 In bed.	T.B. +	98·6 .. 99·4 In bed.	T.B. −	— —	—	At home. T.B. −.
22	97·4 .. 98·4 Wk.	T.B. +	97·6 .. 98·4	T.B. −	97·6 .. 98·4	T.B. +	—
23	98·8 .. 100·0 In bed.	T.B. +	98·2 .. 99·2	T.B. −	98·2 .. 99·2	None.	—
24	98·2 .. 99·5 In bed.	None.	97·4 .. 98·3 Wk. 4 m.	None.	98·0 .. 98·4	None.	Wk. 6 m.
25	97·8 .. 99·3 Wk. 1 m.	None.	97·4 .. 98·6 Wk. 2 m.	None.	97·4 .. 98·4	None.	Wk. 6 m.

CLASS III.—*Not Improved.*

	A.M. P.M.		A.M. P.M.		A.M. P.M.		
26	98·2 .. 98·8 In bed.	T.B. +	98·0 .. 98·8	T.B. −	98·0 .. 98·8 In bed.	T.B. +	Set back owing to *B. coli* cystitis and pyelitis 2 months after sanocrysin.
27	97·0 .. 98·0 In bed. (Oral temp.)	T.B. +	97·2 .. 98·0 In bed. (Oral temp.)	T.B. +	— —	—	Case of T.B. lung and spinal caries. Started T.B. epididymitis soon after sanocrysin.

CLASS IV.—*Died.*

	A.M. P.M.		A.M. P.M.		A.M. P.M.		
28	100·0 .. 101·2 ..–104·0 In bed.	T.B. +	— —	—	— —	—	Widespread disease and cavities both lungs. Died August 2nd, 1926. Total dose, 0·3 g.
29	98·6 .. 100·6 In bed.	T.B. +	— —	—	— —	—	Died Oct. 3rd, 1926. Pneumothorax right side, active disease with cavity left lung.
30	99·0 .. 100·0 In bed.	T.B. +	— —	—	— —	—	Died Jan. 1st, 1927.

Wk. = Walking. m. = miles.

After a moderate reaction—i.e., a rise in temperature of 1°–2° F.—the dose should not be increased at the next injection. After a severe reaction temperature rise of 3°–4°, or when there is marked albuminuria or a rash, the interval should be increased and the dose diminished. The question of dosage is complicated by the fact that although the tolerance to the drug tends to increase, this may be more than counterbalanced by cumulative action as excretion is slow.

The blood sedimentation test is of some value in confirming the clinical impression of the degree of toxæmia. The rate of sedimentation tends to become more rapid during treatment, but subsequently rises to more normal figures. Rapid sedimentation, and particularly a sudden increase in the rate of sedimentation, is an indication for caution. In severe cases it is often better to give doses of 0·1 g. daily,[4] or 0·25 g. on alternate days rather than to attempt to give larger doses at longer intervals.

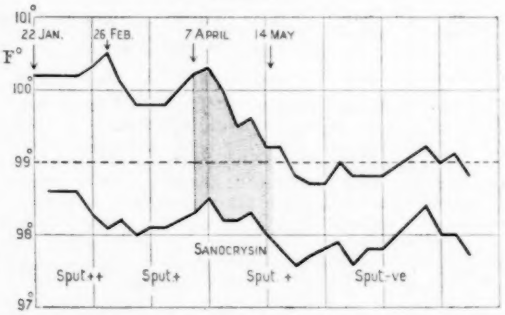
It has been usual to give a total of 6–8 g. as a first course, and then to wait about three months before giving a second course of 4–5 g. A more rational procedure is to continue to give the maximum dose until the patient has ceased to react. Mollgaard has shown that healthy animals show no temperature reaction, even with large doses of sanocrysin.[5] In treating tuberculous subjects, the most severe reactions usually occur with the first few doses or with the first full dose; subsequently they tend to diminish and finally to disappear. The total amount of gold salt which has to be given before the patient's temperature ceases to be affected has varied in our cases from 2 or 3 g. to more than 10 g. During the second course temperature reactions are rare, and 4 to 5 g. seems to be a sufficient amount in the majority of cases.

Reactions.

The most dreaded reaction of sanocrysin treatment is *shock*. This is similar to the tuberculin shock produced experimentally on animals, and is characterised by albuminuria, subnormal temperature, and weak pulse. This reaction has not been observed in any of our cases; it is true that the majority have had transitory albuminuria at some time during treatment; this has never lasted more than a few days. It has always been looked on as a signal of possible danger, and no further injection has been given until the last trace has disappeared; the dose is never increased for the next injection, nor is the interval shortened. As observed by Faber,[6] an *early* and a *late* type of albuminuria have to be distinguished in sanocrysin treatment. The former never occurs in non-tuberculous animals treated with sanocrysin, and its duration may be shortened by injections of antituberculous serum. Late albuminuria, on the other hand, runs a much more protracted course and is of quite unknown origin. Early albuminuria was generally considered to be toxic in origin and closely associated with shock, but recent work [7] has shown that the majority of human cases presenting this symptom have no tendency to shock, and that serum injections have no effect on the duration of the condition. Frandsen [8] has recently studied the effect of sanocrysin injections on the kidneys of healthy rabbits. He finds that amounts considerably in excess of the largest therapeutic dose can be given repeatedly without the least damage to the kidney. Only when very large doses are given over a very long period are changes reminiscent of arterio-sclerotic kidney produced. This is in sharp contrast not only with the changes observed in poisoning with other heavy metals, but also with the post mortem findings in patients dying from shock in sanocrysin treatment in which parenchymatous changes are invariable. The late protracted type of albuminuria has never been observed in our cases.

Rise of temperature has been constant during the early stages of treatment. By beginning with small doses and increasing gradually we have been able to avoid severe degrees of hyperpyrexia. Temperatures of 103° or more have only been observed in two or three cases in which severe skin reactions were also present. These temperature reactions, like the albuminuria, may be divided into an early and a late type. In the former the rise of temperature tends to be sudden and reaches its maximum within a few hours of the injection; it is usually lower on the following day, but not infrequently may be higher on the second night, after which it comes down by lysis during the next few days. The late temperature reactions are much less common and usually occur five to seven days after the injection; the rise is more gradual than in the early type and the temperature remains above normal for a week or ten days. Both types of temperature reaction are associated with an increase in the amount of sputum and auscultation over the lesion usually shows an increase in the moist sounds present. In three cases the late temperature reaction was associated with the reappearance of T.B. in the sputum which had become negative during the earlier stages of treatment.

CHART 1.



Rectal temperature record (Fahrenheit) of Case No. 1, showing the weekly average reading of morning temperature (bottom line) and evening temperature (top line). The vertical lines mark four-weekly periods.

Skin Reactions.

These are among the most serious inconveniences of treatment. Severe morbilliform rashes followed by desquamation or even weeping eczema and associated with high temperature have only occurred in five of our cases. This complication necessitated a break of several weeks in the treatment. Slight skin reactions in the form of scattered papules or localised rashes on the elbows or knees have been more frequent. It is impossible to tell at first whether these rashes are trivial and transitory or whether they are the first signs of a severe reaction; it is therefore advisable to proceed with great caution as soon as a skin reaction appears. Ulcerative stomatitis has been noted in five cases and necessitated an interval of 10 to 14 days as the amount of ulceration immediately increases even if a reduced dose is given after the usual interval.

Nausea and vomiting and occasionally diarrhœa are complications which tend to occur towards the end of treatment when large doses of gold are given. A metallic taste is often noticed during or immediately after an injection; this may be closely followed by nausea and vomiting.

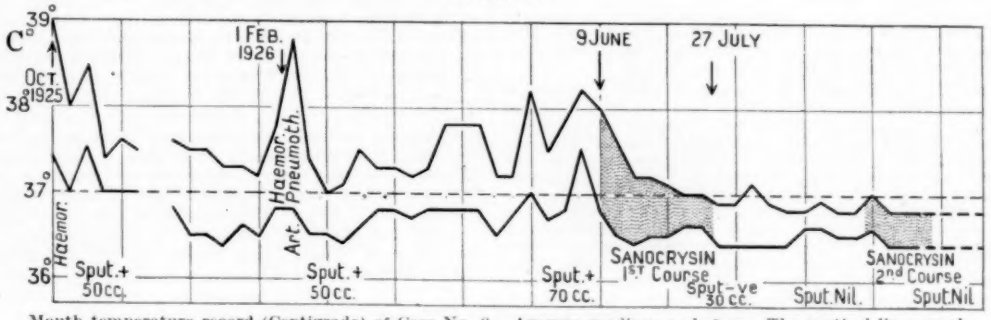
Loss in weight is a very variable phenomenon; some patients actually gain during the course of treatment while in others as much as a stone has been lost in two months. Considerable light has been thrown on the nature of the reactions observed in sanocrysin treatment by the recent work of Madsen

[4] L. S. T. Burrell: Sanocrysin in the Treatment of Pulmonary Tuberculosis, Tubercle, July, 1926.
[5] Mollgaard: Loc. cit.
[6] Faber: Traitement de la Phthisis pulmonaire par le Sanocrysin, Acta Tub. Scand., 1925, vol. i., Fasc. 1.
[7] Mollgaard: Acta Tub. Scand., vol. ii., Fasc. 3.
[8] Frandsen: The Action of Sanocrysin on Healthy Kidneys in Rabbits, Acta Tub. Scand., 1926, vol. ii., Fasc. 3.

and Morch in experimental tuberculosis.[9] These investigations show that when an attenuated culture is used for infection the disease may be healed by means of gradually increasing doses of sanocrysin; should large doses be given early in treatment violent reactions and fatal shock result. Virulent strains, on the other hand, require to be treated with large doses from the start; severe reactions do not occur, yet the disease is arrested in the great majority of cases.

We have not had the opportunity of treating a really virulent infection with sanocrysin, but our observations seem, on the whole, to accord with the animal experiments of Madsen and Morch. It is, of course, very difficult to form an accurate opinion on the virulence of the strain affecting any particular patient since the clinical picture observed is the resultant of the virulence of the bacillus and the resistance of the body. We have, none the less, noted that patients who appear to be thoroughly overcome by the disease to which they offer little resistance rarely have severe reactions. An exception to this rule is seen in the case in whom the skin reaction was so severe as to shorten the life of the patient. Stomatitis and skin reactions have been relatively more frequent in patients with good powers of resistance. Severe skin reactions have never been observed in a second course of treatment, but stomatitis has been more frequent than in a first course.

CHART 2.



Mouth temperature record (Centigrade) of Case No. 2. Average readings as before. The vertical lines mark four-weekly periods.

Results.

Every aspect of medicine has its difficulties in diagnosis, prognosis, and treatment, but none of these involves such problems as the decision as to whether a certain treatment is having a beneficial effect on a patient or whether the improvement observed is unconnected with the treatment or even in spite of it. In no disease could this problem be more difficult than in tuberculosis in which improvement, temporary or permanent, occurs in the great majority of cases treated in a sanatorium. The following table is therefore given with all reserve and with the knowledge that the figures given cannot pretend to scientific accuracy but merely represent our clinical judgment on the case involved. In all 37 cases have been treated with sanocrysin; seven of these are not included in the following table because they are still under treatment, because the diagnosis of tuberculosis is uncertain, or because (in one case) treatment was soon abandoned owing to the neurasthenic condition of the patient.

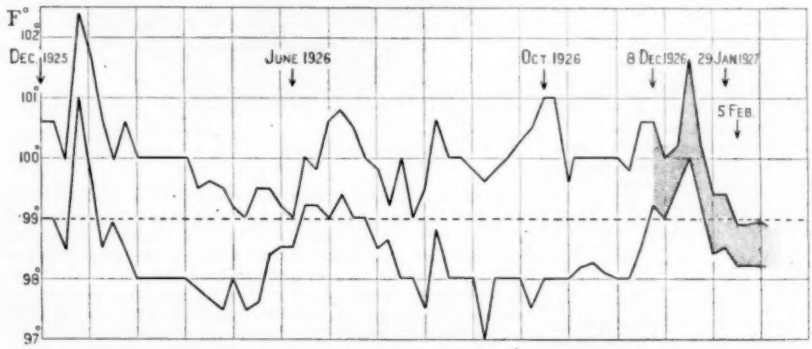
Class.	
1. Improvement considered to be due at least partly to sanocrysin	17
2. Improved but doubtful if due to sanocrysin	8
3. Not improved	2
4. Died	3
	30

The 17 cases in which the improvement is attributed to sanocrysin include 14 in which the disease had reached the stage of cavity formation.

In a number of these cases the improvement in the physical signs was so rapid that it is difficult to believe that it could have been effected without the help of sanocrysin. This improvement was confirmed in several cases by X ray examination which showed the disappearance of soft infiltration in a relatively short time. Fibrous tissue appears to be little affected.

In the tabular statement an attempt is made to give some impression of the condition of patients before and after sanocrysin treatment, and also their subsequent history. It will be seen from the table that out of 25 cases with tubercle bacilli in the sputum before treatment 19 became negative during the course of injections.

CHART 3.



Rectal temperature record (Fahrenheit) of Case No. 14. Average readings as before. The vertical lines mark four-weekly periods.

Illustrative Cases.

CASE 1.—Male aged 28. Hæmoptysis two and a half years ago, but continued work. Sputum T.B. plus, April, 1925. In bed almost continuously since then. Arrived Montana Jan. 22nd, 1926. Signs of severe and widespread disease both lungs with several cavities. Much emaciation. Blood pressure, systolic, 80; diastolic, 55. Much sputum; T.B. plus. Temperature shown on Chart 1. 6·85 g. gold given between April 7th and May 14th, 1926. Temperature normal, sputum negative, and much reduced in amount. Up all day and walking six miles by June. Sputum again positive in July, but second course of gold followed by

[9] Madsen and Morch: Traitement par le Sanocrysin de la Tuberculose Expérimentale, Acta Tub. Scand., vol. ii., Fasc. 2.

negative sputum. Went home for two months, but cough and sputum increased. After third course temperature again normal, but still some sputum T.B. plus. Blood pressure, 120/90.

CASE 2.—Female aged 23. Dry pleurisy June, 1925. November, 1925, cough, sputum T.B. plus. Large cavity right upper lobe. January, 1926, large hæmoptysis, for which right artificial pneumothorax induced. Temporary improvement, but pneumothorax obliterated following pleural effusion; sputum T.B. plus. Sanocrysin started June, 1926, 6·5 g. given. Temperature rapidly came down to normal (Chart 2). Sputum negative, five weeks later no sputum. Second course of sanocrysin ten weeks after first. Now very well. Gained 25 lb.

CASE 30.—Female aged 22. Caseous pneumonia left upper lobe June, 1925. Arrived Montana October, 1926. Physical signs and X ray showed left upper lobe replaced by cavity, lower lobe extensively diseased. Slight infiltration spreading horizontally from right hilum. Bad prognosis given, but left artificial pneumothorax started Nov. 24th. Temperature came down from 100°–102° to almost normal during following week, but rose again to 99° morning and 100° evening a few days later. Signs in right lung more definite. Sanocrysin (0·1 g.) started Dec. 3rd. Temperature normal from Dec. 17th to 21st, and sputum almost stopped. Dec. 22nd beginning of rash (after 0·6 g. gold) which took the form of a weeping eczema over the whole body. Temperature 102° to 103·6°. Injections of Mollgaard's serum without effect. Death Jan. 1st, 1927.

CASE 14.—Female aged 39. Arrived Montana Dec. 20th, 1925. Left upper lobe replaced by cavity, extensive infiltration lower lobe and scattered disease in right lung. Bad prognosis given, but absolute rest, mostly out of doors on wheeled bed, for one year caused slight improvement on the whole, but still febrile and sputum abundant. Sanocrysin started Dec. 9th, 1926, small doses given, 0·1 g., increasing gradually to 0·6 g. Temperature came down almost to normal (Chart 3), sputum much diminished, and great improvement general condition.

Conclusions.

1. The dangers of sanocrysin treatment have been greatly exaggerated. With careful individualisation, gradually increasing doses and attention to reactions the treatment should only very rarely cause harm.

2. The large proportion of T.B. positive cases which became n gative (if only temporarily) and certain cases with fever of long duration which became afebrile point to a specific effect of the drug on the tuberculous process.

3. Whereas sanocrysin may be of benefit in any case which has not reached an advanced stage of emaciation, the likelihood of benefit increases as the case approaches the early and pneumonic type and diminishes with the long-standing fibrotic type.

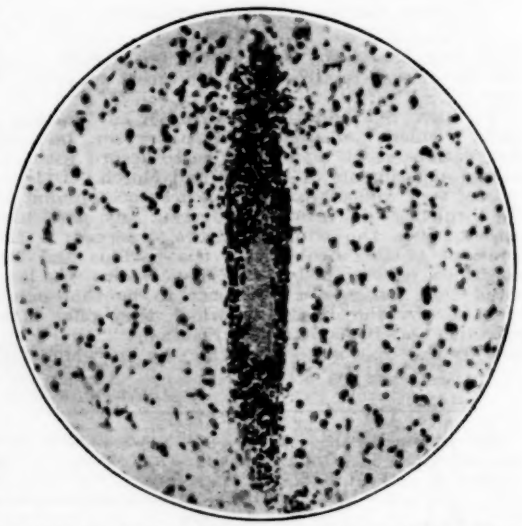
4. The animal experiments of Madsen and Morch suggest that the clinician would be helped considerably if he knew the virulence of the strain of tubercle bacillus affecting each patient. There is a need for close coöperation between physician and pathologist on this point.

5. Although it is probable that sanocrysin has a specific action on tuberculosis, it is still far from being a "cure" for the disease. The benefit derived is, in a number of cases, only temporary. The striking success obtained in certain cases in the early days of sanocrysin treatment with the use of large and often dangerous doses led to the belief that it was desirable to attempt to sterilise the tissues completely in the course of a few weeks. Similar claims were made by Ehrlich in the early days of salvarsan treatment and the following reflexion seems natural. If it is now found that long specific treatment is necessary, even in early cases of syphilis, surely it is too much to expect that tuberculosis will be easier to cure and that a shorter time will be sufficient. Mollgaard's calves were treated within about a fortnight of infection and gave results comparable with those obtained in the arsenical treatment of primary syphilis. The fact that we cannot get as good results in human cases of much longer standing gives no occasion for pessimism, but encourages us to direct our attention to evolving a more satisfactory system of doses which will enable us to derive more benefit from a drug which has already given favourable results.

EXPERIMENTAL PRODUCTION OF THE MENINGO-ENCEPHALITIS OF MUMPS.

BY M. H. GORDON, D.M. OXF., F.R.S.,
CONSULTING BACTERIOLOGIST TO ST. BARTHOLOMEW'S HOSPITAL.

THE interesting case of mumps with symptoms of encephalitis recently described in THE LANCET (March 12th) by Dr. Harry Bedingfield has reminded me of an example of this condition which was produced in course of an experimental study of the virus of mumps in 1913. The primary object of the investigation in question was to determine whether any of the well-known nervous complications of mumps could be produced in monkeys by the intracerebral injection of a bacteria-free filtrate obtained by passing a gargle from an ordinary uncomplicated case of mumps through the Berkefeld filter. The results of this experimental inquiry were described in a special report to the Local Government Board (New Series No. 96) published in 1914. Out of some 10 monkeys injected in this way



A blood-vessel in the cerebral cortex of the monkey, showing perivascular infiltration. Magnification × 200.

four developed symptoms of nervous disturbance and died in from 3–9 days, and sections of the central nervous system showed in all these cases pronounced degenerative changes in the nerve-cells. Infiltrative lesions, however, were conspicuous by their absence. In the case of one of these monkeys that developed meningitic symptoms after intracerebral inoculation with a filtered gargle in the manner referred to, however, further sections were made of the brain after the report had been issued, and at one place in the cortex a spot was found where definite infiltrative evidence of encephalitis was present. The section showing this lesion was photographed at the time by Dr. Albert Norman for me, and I was reserving these photographs until I had been able to carry out a further study of neurotropic viruses in general, and of mumps amongst others. The case published by Dr. Bedingfield, however, suggests that this experimental evidence on the subject of mumps encephalitis may possibly have some interest for clinical observers at the present time, and therefore I submit it for what it is worth.

On Jan. 18th, 1913, a *M. Cynomolgus* monkey (No. 8) was inoculated intracerebrally with 1·5 c.cm. and intraperitoneally with 5 c.cm. of the filtrate that had been obtained by passing 100 c.cm. of saline that had been gargled by a patient on the second day of mumps through an ordinary Berkefeld filter. All the usual precautions necessary in this work were taken, and the filtrate was demontrated to be free

of ordinary bacteria. Three days after injection this monkey became quiet, and on the fifth day the symptoms of headache becoming prominent the animal was placed under a general anæsthetic and lumbar punctured. The cerebro-spinal fluid was under increased pressure—some of it spurted out and was lost, but 2–3 c.cm. were collected. This cerebro-spinal fluid was slightly turbid and contained 1500 white cells per cubic millimetre, of which 82 per cent. were lymphocytes, 12 per cent. polymorphonuclears, and 6 per cent. endothelial cells. No bacteria were found in films of it and cultures remained sterile. The monkey's symptoms were much relieved by the lumbar puncture, and though not as lively as usual it was so much better during the next two days that its recovery seemed possible. Later, however, it relapsed, got progressively weaker, and died on the ninth day.

Post-mortem.—No definite naked-eye changes could be made out except for some patches of congestion in the liver and a pronounced degree of fatty change in the cells of the convoluted tubules of the kidney. No pus was found in the central nervous system which appeared to be merely congested. Films of the cerebro-spinal fluid showed a majority of lymphocytes, but no bacteria, and cultures in broth and agar with blood enrichment from the cerebro-spinal fluid and from the heart blood remained sterile. Sections of the cord showed a variable degree—never very pronounced—of infiltration of the pia-arachnoid with lymphocytes. In both cord and cortex there was well-marked hyperæmia, leading occasionally to rupture of the capillaries and small extravasations of blood. A proportion of the nerve-cells both of the cortex and also of the anterior horn cells of the cord showed pronounced degenerative changes.

Discussion.

A coloured illustration was attached to the report showing the appearance of the anterior horn cells of the cord in this monkey. A search for perivascular infiltration or for foci of inflammatory cells in the substance of the central nervous system was unsuccessful at the time that the report was made. Subsequently, however, some further sections were made of remaining pieces of the cortex, and at one spot the familiar infiltrative changes of encephalitis were found—namely, perivascular infiltration and also foci of leucocytes here and there in the grey matter. The accompanying microphotograph seems to place the presence of encephalitis beyond reasonable doubt. This particular monkey, therefore, after inoculation with the filtrate of a gargle from an ordinary case of mumps without nervous manifestations, developed a condition of acute meningo-encephalitis, to which it succumbed on the ninth day.

Clinical and Laboratory Notes.

A CASE OF INJURY TO THE PLACENTA DURING KRAUSE'S METHOD OF INDUCTION.

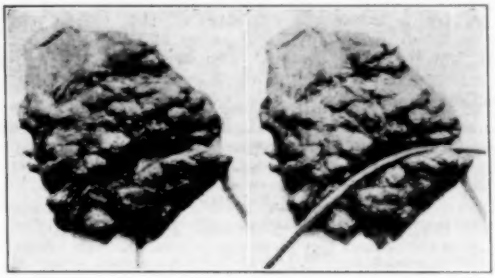
BY J. HARGREAVES ROBINSON, L.A.H. DUB., L.M.R.C.P. IREL.,

HON. SURGEON TO THE ROYAL MATERNITY CHARITY, LONDON; CAPTAIN, R.A.M.C.; ASSISTANT TO SURGEON IN CHARGE, SURGICAL DIVISION, CAMBRIDGE HOSPITAL, ALDERSHOT.

THIS note relates to the second confinement of a woman, the subject of pelvic contraction.

Her first child was stillborn after a difficult instrumental delivery, and in the second pregnancy I advised induction, and at the time chosen passed a bougie into the uterus. No obstruction seemed to be encountered as the bougie was introduced, and the only evidence that anything was wrong was a severe hæmorrhage, arterial in colour, ejected forcibly to a distance of about five feet. I withdrew the bougie, ruptured the membranes, and quickly plugged the cervix and vagina with a large and very tight tampon. A binder was immediately applied, and after once encompassing the abdomen, was twisted two or three times to act as a tourniquet, the two ends of the binder being again passed under and over the patient and securely fastened.

The patient was pulseless, and I thought that the bougie had abducted a low-lying placenta. She was returned to the ward and the foot of the bed was raised. Her pulse and colour slowly returned, and shortly afterwards the fœtal heart was audible. I therefore concluded that there had been injury to, without complete abruption of, the placenta. Labour pains soon commenced, and the tampon was removed when the head became fixed. The fœtal heart was frequently examined, and preparations were made to meet any conditions that might arise. Thirty-two hours elapsed from the time of the placental hæmorrhage to the birth of a living child which has survived; when the child was born the uterus was more firmly held than is usual, and it was massaged when occasionally it showed a tendency to relax. The cord continued to pulsate for a longer period than is usual.



The placenta, showing the tract of the bougie.

When the placenta was expressed, it showed the track of the bougie, which had almost severed it, as shown in the accompanying photograph. The bougie used was of the type made for the purpose. A large quantity of clots were expressed from the uterus, and when it was empty pituitrin and ergotinin were given by parenchymatous injection. The infant was born in the membranes, completely and symmetrically separated at the margin of the placenta. The mother had a transient syncopal attack when the uterus was empty. The puerperium was normal.

A CASE OF ABDOMINAL PREGNANCY WITH UNUSUAL FEATURES.

BY JOSEPH SILVERSTONE, M.R.C.S. ENG.,

FORMER HOUSE SURGEON, WESTMINSTER HOSPITAL; HOUSE SURGEON AT THE NORTH STAFFORDSHIRE ROYAL INFIRMARY, STOKE-ON-TRENT.

THE following case appears to be worthy of record.

A woman, aged 32, was admitted to Westminster Hospital on August 13th, 1926, when she had had amenorrhœa for two months. The history was that she had a miscarriage ten days before admission. The doctor then in attendance stated that he had "got it all away," and that he had cleared out the uterus. He showed her the afterbirth. Two days later the patient experienced a pain in her left side, and felt a lump in this region about the size of an egg. The lump increased in size and the pain became worse. A hot water-bottle caused both to disperse.

On admission she had a temperature of 99·2° F., and the pulse-rate was 98. She was very nervous, and complained of pains all over the abdomen, which was very tender. Some slight rigidity was detected in the left iliac region. There was no vaginal discharge and there was a suspicion of a fullness in the left fornix. The urine contained pus, and there was pain on micturition.

The condition settled down, and the patient was quite comfortable for nine days. On August 22nd, however, she felt faint and she began to vomit. She became very pale, sweated profusely, and was very collapsed. The pulse-rate rose to 130, and the pulse was very feeble. There was also a slight blood-stained vaginal discharge. The diagnosis of ruptured ectopic gestation was made, and an operation was performed by Mr. G. T. Mullally, while simultaneously Mr. C. Price Thomas carried out a blood transfusion. The left tube was found to be ruptured in almost the whole of its length, and was removed. No trace of the fœtus was found at the operation.

The patient recovered from the operation and did very wel for a fortnight. Then suddenly she began to vomit, and her pulse-rate rose to 130; it became apparent that she had acute intestinal obstruction.

She was operated upon by Mr. C. Price Thomas on Sept. 6th, and it was found that a loop of small intestine was obstructed by a band extending across the brim of the true pelvis. This was divided, and the bowel freed. The left side of the abdomen was about to be examined when a fœtus, about one and three-quarters of an inch in length, shot out from under the left edge of the wound. A small umbilical cord was present, which led down to a definitely

formed placenta. The latter was found to be attached to coils of small intestine, descending colon, and omentum. It was separated from its attachments, the attached omentum being removed, and the raw surfaces on the bowel were over-sewn.

The patient did very well and completely recovered.

The sequence of events may be interpreted as follows. The patient had an ectopic tubal gestation from the onset, and the doctor cleared away a decidual cast. When admitted she had a slight hæmorrhage from the Fallopian tube. This was followed, 14 days later, by a complete rupture of the tube, which necessitated operation, the fœtus at this stage being shot out into the general abdominal cavity, where it continued to develop as a secondary abdominal pregnancy.

I am indebted to Mr. G. T. Mullally for his permission to publish this case.

A CASE OF ERYTHEMA NODOSUM FOLLOWING SMALL-POX.

BY WILLIAM L. TULLIS, M.D., D.P.H. ST. AND.,
ASSISTANT MEDICAL OFFICER OF HEALTH, MIDDLESBROUGH.

THE following case presents several features of unusual interest.

The patient, an unvaccinated girl of 6 years, was admitted to Hemlington Hospital on Feb. 1st, 1927, suffering from small-pox. She came from an outlying area and inquiry elicited the fact that the child's eruption had first made itself manifest on Jan. 20th. Six days earlier she had been suffering from malaise, headache, and vague pains. Examination on admission to hospital revealed a rash centrifugal in distribution. The majority of the spots had assumed the form of crusts, amber bead seeds being found especially on the skin of the forearms and ankles.

On Feb. 22nd 10 or 12 swellings, some about the size of a large pea, and others the size of a hazel-nut, made their appearance over the extensor aspect of both legs. Pain and swelling were simultaneous. Some of the nodules were circular, others oval in shape. They were all exquisitely tender on pressure, and involved the subcutaneous tissue as well as the skin. At first bright red in colour they rapidly assumed a dusky hue, and in four days the legs appeared normal. Œdema was not marked.

There was no elevation of temperature, and the pulse and respiration-rate were unaltered. The action of the bowels was normal. Careful examination of the child failed to reveal any evidence of rheumatism. There were no joint pains, no sore-throat; and the heart was normal. The child's general condition appeared good and there was no sign of either tuberculosis or syphilis. The Wassermann reaction was not taken however.

The patient was given salicylate of soda 15 gr. daily, and the lower limbs were protected by cotton-wool. She was confined to bed during her stay in hospital which terminated on March 1st.

This is the first case of erythema nodosum that I have encountered in a series of 1900 cases of small-pox. The chief points of interest are: (1) the age of the patient, and (2) the association of the condition with variola.

INDUSTRIAL PSYCHOLOGY.—The annual report of the National Institute for Industrial Psychology was presented recently to the constituency and contains a summary of the active work undertaken, and undertaken to an extent which has justified a considerable increase in the staff of the Institute. The claims of the work and the appeal fund for its support deserve medical endorsement. Expert assistance has been given by the Institute, for example, to the Industrial Fatigue Research Board in the study of problems submitted by the War Office and the Prison Commission, while many children are now examined and advised according to the vocational guidance laid down by the Institute. Inquiries have been made into such varying matters as accidents in mills, the individual differences of workers in their sensibility to colours, the effects of menstruation upon mental and muscular efficiency, and the influence of ultra-violet rays on factory workers. The work of the committees, the character of the investigations in hand, and the arrangements for spreading the activities of the Institute justify the Council in pressing the Appeal Fund upon public attention.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF COMPARATIVE MEDICINE.

AT a meeting of this Section held on March 16th, at which Sir D'ARCY POWER, President of the Section, occupied the chair, Prof. H. MOLLGAAR), of Copenhagen, read a paper on

Chemotherapy with Special Reference to Heavy Metals.

The conception of specific therapy now commonly held was, he said, that it was the same as immunotherapy—in other words, that the therapeutic agent was inherent in the metabolism of the organism itself. No doubt in this respect the immunobiological powers of the organism represented the ideal form of therapy. In many instances—and especially in the case of certain diseases—the action of these powers did not bring about a cure, even when backed up by general medical treatment with vaccines or serums. This failure arose from one of two reasons: either the patient could not produce the agents in sufficient quantity, or their action on the parasite was prevented. In these cases the clinician was faced with the necessity of effecting an alteration in the dominating pathological conditions of the infected organism. This he did either by removing the causes which were preventing the exercise of the natural powers or by concentrating on the destruction of the parasite itself. Since the pioneer work of Ehrlich, scientific chemotherapy had taken account of both these possibilities. The object of research on chemotherapeutic lines was to discover substances which, directly or indirectly, inflicted the greatest possible harm on the parasite with the least injury to the host. It could not be said that any substance had as yet been produced having any remarkable effect on invading micro-organisms without injuring the patient, and our existing knowledge of chemical constitution and pharmacological action was too fragmentary to open up with certainty a way for the preparation of substances fulfilling this requirement. Experimental chemotherapy was therefore at present a series of approximations to the ideal therapy which was carried out by the organism itself, and Prof. Mollgaard thought this was likely to remain the position for some years. This was supported by the fact that the action of any substance now used was not limited strictly to a certain parasite. The effect of even the most approved chemotherapeutical substances seemed to be due to chemical affinities of a more general character, and the term "specific therapy" could be applied only with reservation.

Ehrlich's original conception, Prof. Mollgaard continued, was that the action of chemical substances on the living cell was subject to the existence in such substances of chemical groups or radicals which were susceptible of reaction with other chemical groups in the cell. This conception afforded a basis for current views on metabolic processes.

On the other hand, Ehrlich's conclusion that a parasite could not be killed in the organism by any chemical compound not having a special chemical affinity to its protoplasm was not valid. The substance was not simply introduced to the parasite in a watery solution; it was injected into the very complicated system of the animal body where it underwent chemical changes which might greatly alter its therapeutic effect. Experience seemed to show that chemical compounds might kill parasites in the organism not by reacting with them, but by stimulating the natural powers of immunity. This might prove important for the future development of the method, as it meant that the chemotherapeutist had to deal not only with the chemical reagent and the parasite, but also with the reacting tissue of the

infected person. C. H. Browning had happily expressed this when he said that chemotherapeutic substances reacted in coöperation with the tissue.

Discussion.

Sir PERCIVAL HARTLEY said the point which particularly interested him was that though sanocrysin had no effect on certain bacilli, yet if a different strain of those bacilli were used, the drug might have a demonstrable effect. It would be of interest to learn more about the differentiation of strains. Did Prof. Mollgaard mean differences in the human strain, or such differences as those between human, bovine, and avian types? He had had some experience of treating tuberculosis with sanocrysin, but had lacked the courage to employ large doses at the outset, as he wished to avoid the severe reactions to which they gave rise. He thought it possible, however, that when the doses were so graded as to avoid reaction, the results might not be so good as those which apparently followed the larger doses.

Sir LEONARD ROGERS said he had been reflecting on the parallelism between tuberculosis and leprosy in the matter of chemotherapy, and had come to the conclusion that what Prof. Mollgaard had said might explain many of the observations made in treating leprosy. His own work on leprosy in Calcutta strongly supported the view that the reaction of the tissues following the invasion of the infecting organism destroyed a certain number of the micro-organisms, setting free antibodies which produced a gradual immunity. His aim had been to give not a large dose at the commencement to cause a severe reaction, but small intravenous injections of gynocardate of sodium, to induce a series of moderate reactions. He related several cases of leprosy in which a surprisingly good result accrued. One was that of an Indian patient who had an enormous thickening of the nose, patches the size of the palm of the hand on the back a third of an inch in thickness, and lesions elsewhere. He was weak and ill, but at the end of two months after four small injections the lesions commenced to soften and absorb, and at the end of a year the nasal thickening and the patches on the back had disappeared, while in the tissue cut out no bacilli could be found.

Prof. MOLLGAARD, in reply, said it had been found that the curative influence of sanocrysin depended on the strain, because that was the determining factor in the reaction. When working with two different strains it was found that a cure was brought about in something like 75 per cent. of cases, commencing with a dose of half a centigramme per kilo of body-weight, and working up to one and a half. A sufficient amount of serum had to be employed; but the difficulty was that tuberculous animals were very sensitive to a heterogeneous serum. In human beings it was necessary to refrain from large doses, trusting rather to a slow immunisation by successive and gradually increased amounts. In cases in which large doses were not tolerated it was found that if quite small doses were given over a period of two or three months the eventual effect was good. In the animal experiments carried out it was found that if a dose of two centigrammes per kilo of weight were used a very high percentage of recoveries occurred; if the dosage were reduced to 1·5 the recoveries dropped to about 60 per cent., and to 10 per cent. if the dose was one centigramme per kilo. Below one centigramme the effect was nil. When the disease was severe and was extending rapidly, bigger doses could be employed without risk. These larger doses were, however, contra-indicated in cases in which the disease had existed a year, and much fibrous tissue was present. The first effect of sanocrysin was greatly to reduce the number of bacilli, but in a few months they would again increase, and thereafter, however large the doses given, the bacilli would not again be markedly reduced. That, he assumed, was because the drug was unable to penetrate the fibrous walls, and the need, therefore, was for a more soluble drug which would overcome this disability.

LONDON ASSOCIATION OF THE MEDICAL WOMEN'S FEDERATION.

A MEETING of this Association was held on Feb. 22nd at the British Medical Association House, Miss E. BOLTON, the President, being in the chair.

Dr. ELIZABETH CASSON read a paper on

Maternal Instinct in Medicine.

She suggested that, while the immense strides made in neurology by the careful observations of facts and their subsequent study were freely acknowledged, the study of instinctive behaviour was considerably neglected in medicine. Just as in the spinal cord, medulla, and midbrain, certain tracts are laid down in every individual, so certain definite instinctive responses will occur to set stimuli. Although it is not yet known exactly in what area of the brain these neurotic patterns are prepared, yet it seems certain that they are as definitely laid to develop at various stages in the life of the animal as are the rubrospinal and pyramidal tracts. A low-grade mental defective has no instinct for obtaining food, no curiosity, and no sense of fear, and has, in consequence, to be cared for as an infant all its life. But the normal infant develops all these instinctive reactions at the right time, and as he grows up and during his whole life every activity depends on these same primitive instinctive reactions common to all members of the human race and, to a large extent, to all mammals. To the modern psychologist the play of primitive instinctive reactions is as unceasing in every activity as is that of the nerves governing the limbs. In every instance of behaviour normal or abnormal primitive instinct is demonstrable, and its recognition and study is necessary for diagnosis and subsequent treatment of any abnormal behaviour. W. McDougall has pointed out that certain unmistakable specific primary emotions can be observed in animals. They are best classified according to the three great ends of the life force—self-preservation, race-preservation, and the herd instincts. There are also certain other instinctive reactions with less specific ends. There are *anger*, which is aroused when any instinct is thwarted; *curiosity*, with its impulse to investigate anything outside the previous experience of the subject, which forms the basis of all intellectual development and provides the impulse for all research; *joy*, felt when any instinct is gratified; and *grief*, when any instinct has failed in its gratification.

The best exposition of parental instinct, said Dr. Casson, was given by W. McDougall, who points out that it is largely ignored by philosophers and psychologists, perhaps because "the instinct is in the main decidedly weaker in men than in women and in some perhaps altogether lacking." Discussing what was meant by the maternal instinct, she pointed out that there were three processes in every reaction occurring in the nervous system—stimulus, appreciation, and either action or a strong impulse to action. Appreciation usually showed itself in what was called emotion. The stimulus and the resulting action might vary according to the experience and mental make-up of the individual, but the emotion—for example, fear—was specific and unmistakable. The emotion specific to the maternal instinct was a yearning to cherish. There was, unfortunately, no word for it, but it would be heard expressed by an inarticulate sound by the women in a cinema audience when a child suddenly appeared on the screen. The mental patient, whether neurotic or psychotic, was, to a physician, in the position of a child and provided a stimulus to the maternal instinct. This might be the basis of the resentment felt by the doctor at the slightest interference with his or her treatment; who had not met anger in a parent, when someone suggested that she might bring up her child differently.

In suggesting the maternal instinct as a subject for research, there were a few points to be noticed—the age at which it appeared, its physical basis, its

abnormalities, its relation to infanticide, its absence in advanced states of dementia. Sometimes the return of affection and pity for fellow sufferers or nurses was the first sign of recovery in mental patients. It was not easy to provide suitable stimuli for the maternal instinct in a mental hospital. Babies were scarce and, except for fellow-patients, there was no one to mother. Dogs and cats were the best substitutes. Where they could not be persuaded to mother people, patients might be able to express the allied instinct of nest-building and home-making in crafts and other branches of occupational therapy.

An instinct might be abnormal in its unusual strength—for example, in cranks who keep 20 cats or pester their friends for subscriptions to anti-vivisection societies. It might be aroused by an abnormal stimulus or express itself unusually—Mrs. Jellaby was a notable example. A patient who has lost a baby, or has been nursing some other relative who has died, might thereafter lavish upon herself all the care and attention that she had been giving to the child. In some cases of the instinct being unsatisfied or being repressed, the patients lost all touch with reality. They had babies in phantasy. In a mental hospital one might find an old dement gently nursing a pillow. One of Dr. Casson's patients, who had been aggressive, noisy, and abusive, had become a different person since she was given a doll.

The outcome of Dr. Casson's experience was that while it was not waste of time to investigate blood pressure and knee-jerks, it was equally worth while to investigate the primitive instincts. If a doctor had been called in to discover early that the instincts of sleep and taking food were deranged in the puerperal cases later investigated so carefully at Broadmoor, then the babies would not have been killed by their insane mothers. If investigations were made of the maternal instincts of disgruntled women patients much would be discovered. The profession was willing to supply artificial limbs; it might equally well be their job to supply an artificial baby. The maternal instinct was quite as strong, if not stronger, than the mating instinct in most women, and the doctors must be on the look-out for its repression or wrong expression. Some women realised their need and knew why they were fretting. Others did not know what was wrong with them and did not realise they need the natural outlet of devoted service. They were the kind who kept well by doing war-work and collapsed when they were left without it. For them a cure must be found—they must be persuaded to adopt a child or guided into teaching, nursing, police, infant welfare work, management of working-class houses, or even into politics. By this means a selfish, self-centred, miserable woman might sometimes be transformed into a happy, useful citizen.

JAMES MACKENZIE INSTITUTE FOR CLINICAL RESEARCH.

ON March 8th Dr. HUNTER PATON read a paper on the

Normal Temperature and Pulse.

Referring to the common belief that 98·4° F. is the normal temperature of the body, he pointed out that this figure only represented the mean of continuous readings during the 24 hours. Morning and evening records, as taken clinically, so rarely reached 98·4° in health that such a reading should be looked on with suspicion. In his school work he recorded the temperature, night and morning, of any pupil who might possibly have been exposed to infection, and he isolated the child if 98·4° was reached, provided any other symptom of departure from health was detected. By this plan he had often segregated cases of the exanthemata before they had given rise to infection, epidemic outbreaks being thus averted.

In support of the view that a temperature of 98·4° was rarely recorded in health, Dr. Paton exhibited charts from 61 healthy girls whose morning and evening temperatures had been recorded for 16 days. The temperatures had been taken orally with standard thermometers. The actual observations made numbered 2169. A reading of 98·4° or upwards was obtained only on 225 occasions. Ten of the girls examined did not reach 98·4° once during the 16 days. This agreed with his clinical observation that a temperature of 98·4° was commonly an early sign of a disturbance of health. The level of temperature in convalescence from illness, usually regarded as subnormal, was the same as that exhibited by these healthy girls. Dr. Paton's considered opinion was that the normal temperature from the clinical point of view must be regarded as nearer 97·4° than 98·4°. The most valuable guide, in deciding whether a borderline temperature was a healthy phenomenon or was due to the invasion of disease, was the pulse. If this was increased in rate, or if respiratory arrhythmia was absent, a temperature of 98·4° could not be regarded as physiological. A rise of pulse-rate usually accompanied, if it did not precede, the initial rise of temperature, and an increase of rate persisted after the temperature had reached its natural level in convalescence. Occasionally, however, a rise of temperature might occur before the pulse-rate was disturbed. It was obvious from these facts that the increase of pulse-rate was not due to the pyrexia alone, but that both were due to the presence of toxins. The mechanism regulating cardiac action might be more sensitive to some of these toxins than were the processes regulating bodily heat.

Reports and Analytical Records.

VULPRO SURGICAL DRESSING.

(MANUFACTURED BY VULTEX PRODUCTS, LTD., GENERAL BUILDINGS, ALDWYCH, LONDON, W.C. 1.)

THIS waterproof surgical dressing is not a fabric but resembles in appearance fine rubber sheeting. It is very light, one square yard weighing only 3 oz. The dressing is liberally dusted over with boric acid. When examined the following results were obtained:—

Loss of weight when dried at 100° C.	2·0 per cent.
Soluble in acetone (oils, resins, free sulphur, &c.)	5·3 „ „
Ash	3·0 „ „
Heated at 100° C.	No change in appearance or elasticity.
Boiled with soap and sodium carbonate	
Boiled in water	
Soaked in cold water for 12 hours	
„ „ 1 per cent. lysol	
Contact with fæces and urine for 24 hours at blood heat	Slightly stained.

Vulpro is a waterproof material of extraordinary tenacity bearing in mind its low weight per square yard and the absence of any fabric backing. It is highly elastic and suffers no permanent distortion when stretched, heated, or washed.

SOUTH DEVON AND EAST CORNWALL HOSPITAL.—During the last five years the work of this institution has increased 30 per cent., and a scheme of enlargement, to cost £40,000, has been prepared. The hospital is now seriously inadequate to the needs of the large district it serves. It is intended to make provision for paying patients.

DRUIDS TINFOIL FUND.—The Committee of Control of the Tinfoil (Hospital) Fund of the Ancient Order of Druids report that 94¼ tons of tinfoil were collected by its agency in 1926; in 1925 the total was 72 tons. The committee complain of the "unfair competition" of other organisations which are now collecting tinfoil, not for the hospitals, but for their own purposes. The year's sales realised £2254, making a total since the fund began in 1922 of £8895. Fourteen beds in various hospitals have been endowed with the money; four more are now to be endowed.

Reviews and Notices of Books.

THE LIFE AND WORK OF SIR PATRICK MANSON.

By PHILIP H. MANSON-BAHR, M.D., F.R.C.P., and Lieut.-Colonel A. ALCOCK, C.I.E., F.R.S. London: Cassell and Co., Ltd. 1927. Pp. 273. 16*s*.

ON March 15th Mr. Neville Chamberlain unveiled a tablet in the Albert Dock Hospital to the memory of Sir Patrick Manson, who taught and practised there through the knowledge which he had gained with his own hands in a long struggle with the unfriendly tropics. By a happy chance there appears, almost at the same moment, a second monument to that great fighter, and one which will proclaim him widely and cause many men to think on what manner of man he was and some to follow where he led. Dr. Manson-Bahr and Colonel Alcock show, in this account of Manson, some of the patience for which their hero himself was so conspicuous, and have traced his life in great detail from the growth of his passion for medicine to his retirement from active life, and his death from heart failure in 1922 at the age of 77. His early struggles in Formosa and Amoy are detailed with his long, arduous and fruitful career of research and practice; his splendid creative work for the profession and public in Hong-Kong is described, and so we reach the crown of his life, the foundation of the London School of Tropical Medicine.

His discoveries in tropical pathology are familiar to all, and the volume contains a full list of the mass of valuable literature which he published throughout his life. It is, however, for a portrait of the man himself that most readers will turn to this biography, and they will not be disappointed. A Scotsman of the sturdy Aberdeen breed, with a passion for knowledge and an even stronger one for friendship and service, he was often crippled by gout but remained untiring at his work and as far as possible at his play—for he was a dead shot and a keen fisherman. We get a picture of Patrick Manson from his son-in-law as a lovable no less than an admirable man. The portrait, however, is drawn from the man as he was when, ripened by well-spent years, he returned to London. About the Manson of the lonely Chinese hospitals and the improvised laboratories we can only guess, for few who knew him in those days still survive. All we gather from his diary and letters is a glimpse of one who worked early and late, under the most trying conditions of climate and the severest handicaps imposed by lack of proper equipment and by native prejudice, at the twin vocations of research and healing. We see a man to whom nothing was too much trouble to do supremely well, to whom every discrepancy was a challenge to further exploration, and whom every form of suffering urged to spare no efforts for its relief. Manson's versatility stands most conspicuously out in a history of his life. His researches cover parasites and bacteria of most diverse species; he was a highly gifted surgeon and a very efficient medical officer of health, and was trusted implicitly as an obstetrician by even the exigent Chinese. He was a fine publicist and a capable organiser, and founded the Hong-Kong Medical Society, the Hong-Kong Medical College, and the Tropical Section at the the annual meeting of the British Medical Association. He was a voluminous and admirable writer. In his recreation, apart from his fishing and shooting, he had a professional knowledge of geology and was a first-class naturalist. Very few men combine as he did the opposite qualities of imagination and application; he was content alike with solitude and publicity, and while keenly logical, had a warm, deep humanity.

The book should be read as long as our tropical dependencies rely on the solution of disease problems for their prosperity; in other words, the Father of Tropical Medicine will always be kept in grateful memory.

MICROSCOPY OF THE FÆCES.

Coprologie Microscopique. By M. LANGERON, Chef de Laboratoire à la Faculté de Médecine de Paris; and M. RONDEAU DU NOYER, Preparateur à la Faculté de Pharmacie de Paris. Paris: Masson et Cie. 1926. Pp. 132. 2*s*.

THIS little volume on a very important subject—the microscopy of the fæces—has been framed on modest lines. It claims to be, and, in fact is, essentially practical. Within 132 pages the authors have succeeded in summarising the essentials of this subject. The descriptions of the various objects, parasitic and otherwise, which are found in the fæces are clear and accurate. The text is illustrated with 129 text-figures in black and white, and a useful feature is the micromillimetre scale which accompanies them. Unfortunately, these illustrations, especially of the protozoa, are not up to the usual text-book standard. The greater number could, with advantage, be redrawn for a future edition.

INDEX AND HANDBOOK OF X RAY THERAPY.

By Dr. ROBERT LENK, Privat-dozent of Medical Radiology, University of Vienna. Translated by T. I. CANDY, M.B., D.M.R.E., Hon. Radiologist Royal Gwent Hospital, Newport. London: Oxford University Press. 1926. Pp. 121. 6*s*. 6*d*.

IT is now six years since Dr. Lenk, of Vienna, published this little book, which was quickly translated into several languages. We now have to thank Dr. Candy for an excellent English version. The book is primarily meant for the general practitioner, and by means of a formula describes suitable X ray dosage and filtration for a large number of pathological conditions. These are arranged in alphabetical order convenient for reference. Most X ray workers in time evolve their own technique, but as a working basis for those with little experience, nothing could be better than this handbook, backed up as it is by the mature experience of the Vienna school of radiotherapeutics. This book is well published and well translated, and can be confidently recommended to all radiologists.

THE PRINCIPLES OF PATHOLOGY.

By C. POWELL WHITE, Manchester University Press. London: Longmans, Green and Co. 1927. Pp. 279. 15*s*.

SOME people think that pathology is nothing more than a useful adjunct to medicine and surgery; to them a "pathologist" is one who helps in diagnosis during life by carrying out laboratory procedures, which are now of bewildering variety, and by verifying the cause of death at autopsy. A minority have, however, urged from time to time that pathology is a biological science which can stand on its own feet, and has principles of its own to work out. What these are Dr. Powell White has sought to state in an interesting and refreshing book; it will, we imagine, come as rather a surprise to a good many pathologists that it is possible to discuss the subject in such terms as he uses. His main thesis is that the proper subject matter of pathology is the study of adaptation to adverse conditions, whether the adaptation be one of organism, organ, tissue, or cell: he goes, indeed, further and is prepared to recognise the existence of living units ("biomeres") of a lower order than cells. He derives pathological processes from the processes of general biology and rightly suggests that biologists might get as much help from pathology as pathologists may from biology. The fundamental point from which pathology starts is morbid anatomy, because it is quite characteristic that each living thing has a definite morphological organised structure, and the ultimate basis of life is morphological rather than chemical. Pathological processes are divided

into consecutive (the direct results of injury), adaptive (the attempt to correct the injury), and autonomous (arising within the organism and proceeding along a defined course—e.g., senile changes). Such are examples of the fresh way in which he orders familiar facts. We know of no recent book in English which a senior student might read with greater profit; it is not one to begin with, for it presupposes a tolerable acquaintance with the ordinary data of pathology, and seeks to describe the relationships of pathological processes rather than their details. It is particularly valuable because it is provocative enough to compel the reader to think at least a little for himself. The day is pretty far distant when anyone will write a satisfying philosophy of pathology. Dr. Powell White has certainly not succeeded in his present attempt. But he has done a very real service to the science if he has succeeded, as we think he has, in showing that such a philosophy is possible and in getting people to think along the lines which will help its realisation.

BACTERIOLOGICAL ATLAS.

By RICHARD MUIR, Demonstrator of Pathological and Bacteriological Methods in the University of Edinburgh. Edinburgh: E. and S. Livingstone. 1927. Pp. 134. 15*s*.

THE idea of the Atlas, we are told, is to convey a picture of the various pathogenic micro-organisms as seen with the microscope. This idea Mr. Muir, whose skilful portrayal of microscopical preparations has long been familiar to medical students and practitioners, has successfully realised. The question as to how far it is desirable to insist upon the morphological characters of bacteria, which an atlas connotes, is not relevant, for serious students will soon learn the importance of other methods of distinguishing between organisms. The 60 beautiful plates here reproduced are up to Mr. Muir's usual high standard. The only criticism we would level against the book is that the magnification at which the pictures are produced is considerably greater than is usually attained to by the student, and hence to his mind the organisms are shown in an idealised form.

STRAY LEAVES FROM A PHYSICIAN'S PORTFOLIO.

By Sir JAMES CRICHTON-BROWNE, M.D., LL.D., F.R.S. London: Hodder and Stoughton. Pp. 351. 12*s*. 6*d*.

Sir James Crichton-Browne has published here an olla-podrida of lectures, articles, and literary studies which have appeared from time to time in magazines and reviews and makes from them an entertaining and instructive volume. The first and most serious paper is a reprint of the Cavendish Lecture delivered before the West London Medico-Chronological (sic) Society on June 30th, 1895; this dealt with the conditions known as "Dreamy Mental States," which vary from the well-known "I have been here before" feeling to the state of mental exaltation described by Tennyson and others in which the subjects seem to themselves to "touch the skirts of immensity and mystery." Another paper deals with that unhappy personality Branwell Brönte, who in the author's opinion was not so bad as he has been made out to be. The paper on "Claret in Scotland" is admirable reading at this juncture, especially when it is prophesied that the tax on spirits may be lowered and that on foreign wines be increased. We commend the following remark of Sir James Crichton-Browne to the authorities—"the substitution of whiskey for ale and claret as the popular stimulant in Scotland was a great national misfortune which still affects the country," and the author goes on to give cogent reasons for his statement. Other papers deal with such diverse subjects as Light and Sanitation, Thomas Young, Poisons and Poisoning, and as a whole the book makes excellent matter for reading at odd times.

MICROBE HUNTERS.

By PAUL DE KRUIF. London: Jonathan Cape. 1927. Pp. 389. 12*s*. 6*d*.

THE American edition of this book which appeared last year contained allusions to which strong exception was taken by some of our readers (THE LANCET, 1926, ii., 729). The English edition which has just been issued loses little by the omission of certain chapters containing references to living workers, for the book is no ordered chronicle of bacteriological progress, but a flashlight turned upon some of the peaks in the irregular chain of men whose height of achievement is outstanding. That such beams sometimes give a distorted image—manifest in photographs of public celebrations and on every man's passport—does not prevent Dr. de Kruif's book of impressions, at any rate in the form in which it has reached us, from being vivid and stimulating. He outlines in turn Antony Leeuwenhoek, Lazzaro Spallanzani, Louis Pasteur, Robert Koch, Emile Roux, Emil August Behring, Elie Metchnikoff, Theobald Smith, Walter Reed, and Paul Ehrlich; these sketches show an intimate knowledge of the exhilaration and reaction which in different proportions make up the life of every research worker. Dr. de Kruif's style is exuberant without affectation, and though it may jar some of his readers it will appeal to others. He is sometimes unrestrained and occasionally rather theatrical, but he does make us catch the frenzy, savour the bitterness, and share the triumphs of each investigator in turn. Koch alone does not come alive for the reader, perhaps because the Teutonic reserve and thoroughness does not lend itself to this sort of impressionist study. Certain phrases lose their force by repetition—for example, too many of these pioneers are said to "sniff" round their objectives. Dr. de Kruif is so far steeped in the lives as well as in the works of the microbe hunters whose fortunes he follows that we find ourselves zealous partizans, fearing that the next page will bring news of discomfiture or discredit to those whose adventures no investigator, however humble, can help identifying with his own. All who aspire to enlist among the irregular legions who fight for knowledge of any of the biological sciences will enjoy this book.

JOURNALS.

INDIAN JOURNAL OF MEDICAL RESEARCH. Vol. XIV., No. 3. January, 1927.—In this number P. J. Barraud continues in four lengthy articles his revision of the Culicine Mosquitoes of India, Parts XIX.—XXII.; this is a painstaking work of purely entomological interest.—H. E. Shortt, in collaboration with several fellow workers, contributes a series of five papers dealing with various aspects of the leishmania problem, and together with P. J. Barraud and A. C. Craighead describes abortive attempts to transmit the infection through *Phlebotomus argentipes* to laboratory animals.—R. McCarrison has four original papers dealing with his specialty, the effect of various cereals and manganese on growth, and the further detailed history of goitre in the Military School, Sanawar, Punjab.—R. B. Lloyd, E. Muir, and G. C. Mitra have investigated the influence of syphilis on leprosy as indicated by the Wassermann reaction, whilst N. H. Fairley publishes for the first time his remarkable observations on the spontaneous cure of bilharziasis (*S. spindalis*) in monkeys.—Asa C. Chandler contributes a further series of three papers on the prevalence of hookworm and other helminthic infections in India; E. C. Hodgson, A. C. Vardon, and Zorawar Singh describe, in a preliminary note, the blood sedimentation test as a quick and simple means of differentiation of malaria from kala-azar, enteric, and other fevers.

HEALTH WEEK.—This year's Health Week is being arranged for Oct. 2nd to 8th. Appeals for the coöperation of local authorities have been issued by the responsible committee, of which Prof. Bostock Hill is chairman, from 90, Buckingham Palace-road, London, S.W. 1.

THE LANCET.

LONDON: SATURDAY, MARCH 26, 1927.

LODGING FOR THE NIGHT.

THERE are still a great many homeless people in London. Some of them are incapable of domestic life; some are too frail or too unskilful to earn the rent of a room; others are separated from their friends or families, either by fault or misfortune. All these have to find a roof at night and their choice, if they have little money, lies between the Poor-law casual ward, the free "shelter," the unlicensed doss-house, and the common lodging-house. The first alternative is universally disliked. It smacks of prison, for it means solitary confinement by night and detention by day; its welcome is intended to prevent return, and even if applicants are no longer set at oakum-picking their tasks are often just as useless and therefore as humiliating. The free shelters are of variable quality; they are under no central authority and comprise alike the excellent establishments of the Salvation Army and a series of philanthropic institutions many of which are out of date and insanitary. Shrinking from all kinds of institutional charity, some of the poorest people find cover in the unlicensed doss-houses which still exist in the East and South of London. A bed in a doss-house costs 3*d.* or 4*d.* per night and the standard of comfort is necessarily low since they are run for profit. The same objection applies to many of the establishments licensed as common lodging-houses by the London County Council, which form the fourth alternative resting-place. They number 165, having accommodation for 14,855 men, 1944 women, and 246 married couples, and they may be divided into three groups, according to the tariff. In Group I. (5*d.* to 7*d.* per night) there are only 351 beds for women. These are always fully occupied, and are wholly provided by philanthropic agencies, the reason being that women are relatively expensive lodgers, and with the lower rents leave no margin for profit under the Council's conditions of inspection. In Group II. (8*d.* to 10*d.*) there are 882 women's beds and about 10,500 for men, 3000 of them owned either by the London County Council or by philanthropic agencies. Lastly, in Group III. (from 11*d.* upwards) the female accommodation is privately owned, whilst most of the male beds are kept by the Council. Taking all three groups together the proportion of beds usually occupied is 85 per cent. for men and 92 per cent. for women. The total accommodation available has decreased from 29,574 beds in 1894 to 17,045 at the present time, this being attributable to a steady decline in the numbers of the common lodging-house class. During the same period the Council has secured much greater cleanliness of houses and equipment, and the shocking conditions described about the middle of last century have no parallel to-day.

The above figures are taken from a report[1] by Dr. F. N. KAY MENZIES, which forms an interesting reply to criticisms of the Council's regulation of lodging-houses. In a recent book[2] Mrs. CECIL CHESTERTON gives an account of her own adventures in these institutions.

"There is," she says, "a deplorable lack of proper accommodation for the itinerant London outcast. Be she matchseller or prostitute, she should have the opportunity of getting a decent bed on payment of a fixed sum. Outside the Salvation Army shelters the standard of cleanliness is variable. Among the public lodging-houses, run for individual profit, it is extremely low, and in some of these places the beds are stained, the blankets dirty, the washing accommodation of the most rudimentary kind, and this, it is somewhat disconcerting to find, in houses licensed by the London County Council and under its inspection."

Describing the fate of women left without references or friends she attributes their deterioration, inter alia, to the conditions found in common lodging-houses. Forced to sleep in a dirty bed, without facilities for keeping body or clothing clean, the homeless woman inevitably loses self-respect; sometimes even the public wash-house refuses her admission. Regarded as worthless, she soon becomes so, and for want of a few days' decent lodging and a helping hand acquires the mental and physical stigmata of the outcast. Not only, says Mrs. CHESTERTON, is the accommodation for women often degrading, but it is also insufficient. Although the County Council have established admirable lodging-houses for men they refuse, she says, to do the same for women, because a fair proportion of the lodgers in licensed houses are prostitutes, and the Council are "terrified to be associated in the work of providing beds for prostitutes lest they should be accused of countenancing a loose method of life." To a widespread prejudice against destitute women Mrs. CHESTERTON ascribes the shortage and low standard of accommodation provided for them. And this failure of accommodation she blames for the progressive degradation of many useful members of society. As a remedy she would, first, erect shelters—free or at nominal rents—to which all in need should be admitted without any inquisition; secondly, set up hostels for manual workers; and, thirdly, provide comfortable lodging-houses for women—similar to those for men—at an economic rent of 10*d.* to 1*s.* 4*d.* Thanks to Mrs. CHESTERTON'S efforts a well-equipped lodging for 45 women is to be opened this year in Bloomsbury by Cecil Houses (Incorporated).

Dr. MENZIES sees the situation differently. Even the present reduced accommodation, he considers, is more than adequate, and of temporary shelters there are plenty. The cheaper common lodging-houses are almost always full; but that is because they are kept at a financial loss by philanthropic bodies, and advantage is naturally taken of their alms. Many of the inmates could well afford to pay for beds elsewhere at higher prices, whilst others should properly be in Poor-law institutions. It is almost unanimously agreed, he remarks, that the amount of cheap lodging-house accommodation ought not to be increased, as this step would simply lessen the demand for beds at a higher rental. Attempts have been made in the past, he points out, to provide really good lodgings for working women and girls, but they have almost always come to grief. The lodgers either resented "ordinary disciplinary regulations" or else made no effort to take advantage of the amenities offered. "These are facts of practical experience," says Dr. MENZIES, "which should be borne in mind by those who think that men have been better and more considerately treated than women," and it is certainly to be hoped

[1] Common Lodging-houses and Kindred Institutions. Report by the Medical Officer of Health, L.C.C. No. 2489. 1927. Pp. 35. 1*s.* 6*d.*

[2] In Darkest London. By Mrs. Cecil Chesterton. London: Stanley Paul and Co., Ltd. 1926. Pp. 255. 5*s.*

that a happier fate will attend the new Cecil House, and an establishment of similar purpose which is being put up by the Church Army. Together these institutions will increase the total accommodation for women by 10 per cent. It is right however, to remember that it is not the Council's object to encourage the hostel or lodging-house habit, but rather to hasten its disappearance. In the meantime, though the accommodation appears æsthetically repellant, it is doubtful, says Dr. MENZIES, whether anywhere among the poorer classes there can be found a standard of house cleanliness at all comparable to that of the licensed lodgings. Admittedly, they are far from perfect. Washing arrangements are often inconvenient and in 30 of the 37 houses for women there are no bathrooms. But these conditions are parallel to those in working-class homes. The price paid by casuals is too small to allow provision of a fresh pair of sheets for each newcomer; those offered must be "clean but not necessarily fresh." And in the women's lodgings equipment is especially difficult because bits of bed linen are frequently abstracted and because sheets are easily soiled—facts which partly explain the lower standard of the accommodation provided. Clearly, the present state of affairs need give rise to no complacency. Much has still to be done to ensure that men and women have quarters as good as their money will buy, and a reform in spirit as well as in regulation is needed if the Poor-law is to lose its degrading effect. The lot of the destitute may be improved, however, without wholesale establishment of free shelters or lodgings at a nominal rent. Such philanthropy would create its own problems, and would be mistaken, since the function of charity should rather be to meet emergencies than to sustain the major burdens of society.

BIOLOGICAL RELATIONS OF OPTICAL ISOMERS.

PROBABLY no one could have foreseen that PASTEUR's discovery in 1848 of the association between the asymmetry of the crystals of tartaric acid and their optical rotation when in solution was to lead to a clearer recognition of the intimate nature of the response of tissues to drugs. Yet such is the case, and the story of the intervening steps has been told in a manner at once clear and full of interest in a volume[1] which has recently appeared from the pen of the late Prof. A. R. CUSHNY. The book has a significance apart from that due to its value as a record of a line of work to which he contributed so much, in that it forms the last publication of one of the greatest investigators among the modern school of physiologists. LE BEL and VAN'T HOFF showed in 1874 that optical isomerism exists in those compounds which possess an asymmetric carbon atom in their molecular configuration. When such compounds, however, are built up in the laboratory without use being made in their synthesis of any substance which already shows optical rotation, the resultant compounds are invariably racemic. The resolution of a racemic mixture into its optically active components demands the presence of some compound which is itself optically active. This law is illustrated in PASTEUR's second method of separating the isomers of tartaric acid; he found cinchonidine l-tartrate much less soluble than the d-tartrate, and so by this means was able to resolve the originally racemic mixture. A vast field for speculation is thus opened up as to the origin of the first compound possessing optical activity, and attention is directed by Prof. CUSHNY to the possibility that temporary molecular rearrangements may be brought about by some external source of energy, a suggestion brought forward by VAN'T HOFF and studied by ERLENMEYER when working on the asparagins. A third method of separating optical isomers from a racemic mixture is also to be attributed to the genius of PASTEUR. It was found by him that moulds and yeasts attacked ammonium d-tartrate much more actively than its lævorotatory isomer. The enzymes, however, cannot be classified into those destructive to lævorotatory and those destructive to dextrorotatory bodies; nor do different enzymes select the same isomers from a given racemic mixture. Further, some enzymes act on each optical isomer of a given pair to the same degree, others act on both but with unequal potency, others yet again act only on the one isomer. "It is impossible," says Prof. CUSHNY, "to state a priori which isomer will prove the more susceptible."

These in vitro observations have their counterpart in experiments in which the fate of isomeric substances administered to animals is determined. Since the metabolic changes undergone by such substances in the body must be considered as due to enzyme action, it is not surprising that we usually find the dextrorotatory and lævorotatory isomers attacked unequally, and that occasionally tissues show no preference for the one or the other. For example, d- and l-tartrates are equally oxidised in the tissues, whilst the optical isomers of such closely related bodies as the malates show a distinct difference in their susceptibility to breakdown by the tissues, the natural lævo- being much more readily attacked than the artificial dextro- form. The first definite experimental evidence that a difference may exist in the response of a tissue to the optical isomers of a given compound was brought forward by CUSHNY working on the hyoscyamines. He discovered the interesting fact that l-hyoscyamine was about twice as potent in its action on the nerve-endings of the autonomic nervous system as d-l-hyoscyamine (atropine), the conclusion drawn from this observation being that d-hyoscyamine was practically devoid of action at these sites. This conclusion was shown experimentally to be valid. Analogous results have since been obtained with other isomeric substances such as the hyoscines, nicotines and epinephrins. In some cases each isomer exerts a potency equally to that of its image; in others both are effective but in unequal degree, and yet in other cases one is effective and the other completely inactive.

We find, then, in the study of the pharmacological reactions of isomeric substances a state of affairs which is closely akin to that existing between optical isomers and alkaloidal reagents on the one hand, and between optical isomers and enzymes on the other. CUSHNY points out that there can be very little doubt that fundamentally we are dealing with similar chemical reactions in these three cases: that l-hyoscyamine has a much greater action on the autonomic nerve-endings than d-hyoscyamine for precisely the same reason that l-tartrate is more easily precipitated by cinchonidine and less readily oxidised by penicillium than d-tartrate, "that is, because in the tissues, as in the test-tube, the isomers form compounds with some optically active substance, and these compounds are no longer mirror images and no longer identical in their physical characteristics." There are, of course, other factors besides the optical rotation of a pharmacological substance which must be taken into account in

[1] Biological Relations of Optically Isomeric Substances. By Arthur R. Cushny, M.A., M.D., LL.D., F.R.S. London: Baillière, Tindall, and Cox. 1926. 9s.

attempting to correlate the physical and chemical constitution of drugs with their action on the tissues. G. BARGER and H. H. DALE found that the action of sympathomimetic amines was in some cases greatly reinforced by substituting OH for H in the molecule, and thus rendering one carbon atom asymmetrical. The resultant increase in activity was naturally attributed to the asymmetry, but CUSHNY has recently shown that in the tropeines the presence of the hydroxyl group rather than the asymmetric carbon atom per se is the activating factor. For example, it was found that hydratropyl tropeine, which differs from atropine merely in that the CH_2OH group of atropine is replaced by CH_3 has only about one two-hundredth the activity of atropine in arresting salivary secretion. We see, therefore, how three factors come into play in determining the relative efficacy of a chemical compound in producing a given physiological response. First there is the necessity for a certain molecular configuration—phenacetyl tropeine has a slight atropine-like action—to the compound; secondly, the presence of alcoholic hydroxyl in the side-chain of the acid augments the activity to a very large degree; and thirdly, an asymmetric carbon atom, by conferring optical rotation on the compound, is responsible for the potential difference in pharmacological activity between the optical isomers of that compound. The similarity which a given optical isomer exhibits in its reactions with an optically active alkaloid, with an enzyme, and with the particular tissue on which the isomer concerned is said to exert a specific pharmacological action, points clearly to the presence in the tissue acted upon, of a chemical grouping similar to that found in the alkaloid and enzyme. As Prof. CUSHNY put it, "Pharmacological investigation may then be regarded as a method of applying a qualitative test for the presence of certain chemical groupings in living matter and joins other biochemical methods in that object." It is this valuable method of in vivo biochemical analysis which he has placed in our hands. Such specific effects as those resulting from the action of the digitalis group on the heart muscle and cardioinhibitory centre, of morphine on the respiratory centre, pain path, and gut, and of atropine on the parasympathetic nerve-endings and central nervous system, thus receive a rational explanation. But Prof. CUSHNY was careful to point out that pharmacological methods alone can do little more at this stage of knowledge than to provide further examples of such reactions. Their analysis must await a clearer insight into the fundamental nature of the interactions between optical isomers and alkaloidal reagents on the one hand, and between enzyme and substrate on the other, and these can only be furnished by the experimental methods of physics and chemistry.

POST-MORTEMS AND INQUESTS.

WHEN a consultant, after a careful examination, admits that he has failed to make a diagnosis, the patient is apt to distrust his skill or his thoroughness, and to go elsewhere. The next man approached, realising that a definite conclusion is expected of him, is sometimes tempted to dogmatise on mighty little evidence. His guess may be a lucky one—in which case he derives much credit and still deserves it, since medical diagnosis cannot be an act of rigid deduction. In certain branches of medicine, however, mere presumptive evidence is hardly allowable, however much satisfaction it may give to the parties concerned. These reflections arise from the report of a recent case where a coroner, dissatisfied with the negative results of an autopsy performed by a professor of pathology at a great London hospital, called for another post-mortem by a pathologist known to him, but not attached to any teaching hospital. The second autopsy was duly performed, and although no further light was thrown on the case by the pathological changes found, the cause of death was pronounced to be angina pectoris, on grounds of clinical history. The interesting point is that the report of the first post-mortem examination was if anything fuller and more helpful than that of the second. There seems to have been nothing in the naked-eye examination of the organs to show the cause of death. There is no record that any histological examination of the tissues was made on either occasion.

The last thing we would desire would be to damp a coroner's enthusiasm for post-mortem examinations. These should be held much more frequently than they are, especially in private practice, but the ordinary coroner's post-mortem is often useless, because (*a*) it is done too late—by the time the formalities have been gone through post-mortem decomposition is well advanced; (*b*) no microscopic or bacteriological examination of the organs is made. In a large number of cases the naked-eye examination alone is inadequate; the true condition can only be found on microscopic examination. Moreover, it is a mistake to assume that a post-mortem, even with microscopy, will invariably clear up the mystery of the cause of any death. It is often enough impossible to say why a patient died. A patient may reveal chronic lesions which must have interfered considerably with his physiology, yet he must have carried on with the disabilities for a considerable time. A milder degree of disability, on the other hand, would have proved fatal to another individual. The interesting speculation is often not why did the patient die? but why did he not die months or years before? It is obvious that the clinical history is of the first importance. On clinical evidence alone the cause of death can often be given with a great degree of probability, but the post-mortem may be necessary to exclude other possibilities. For example, a patient suffers from acute gastro-enteritis and dies. In all probability he dies from acute food poisoning and a certificate may justifiably be given. A superficial naked-eye post-mortem may give no more information than that the patient had acute inflammation of the stomach and intestine, and death will be put down to toxæmia or syncope. But a post-mortem may be advisable or necessary to exclude, for example, arsenic, or to determine the nature of the food poison, when an extensive bacteriological and chemical analysis will be necessary. In short, a post-mortem may be necessary to exclude other than apparent causes of death, but it must be complete.

A combination of clinical and pathological evidence will usually clear up any case, but the danger in legal circles lies in placing too much importance on pathological evidence. It is almost true to say that the better the pathologist the worse the witness. In the witness-box it is no good offering suggestions or tentative opinions. To the legal mind, facts are facts, and science is science, and it is possible to be certain of anything under the sun. The scientific pathologist will rarely say more than that his findings did or did not square with the clinical evidence, or that he found certain conditions which might well be incompatible with satisfactory physiological functioning of vital organs. It is one thing to discover pathological lesions, and quite another to determine how far these lesions are of vital importance; even an expert can only express an opinion, and in 99 cases out of a hundred the opinion may be correct. But, sooner or later, he is asked, not whether a person died of such and such a lesion, but whether he was killed by it. Then he comes up against the conflict between scientific doubt and legal necessity. For the credit of medicine scientific fallibility—in the biological sciences especially—should be properly recognised, and medical witnesses will always be in a dilemma till this is done.

Annotations.

"Ne quid nimis."

THE HEALTH OF THE COAL-MINER.

WE have already given some account [1] of the Industrial Health Education Society and its activities in teaching employees to defend themselves against occupational hazards. Not the least useful among its publications are the pamphlets dealing with conditions of life in different industries, and of especial interest at the present time is one entitled, "The Coal-Miner," by Prof. E. L. Collis, whose experience in the preventive medicine of mining and whose efforts to promote the welfare of miners make him a recognised authority. The long series of stoppages in the industry is, he thinks, the price of neglecting the miner's needs. Lack of provision for details of comfort and efficiency leads directly to a high mortality from the four main causes of death—phthisis, pneumonia, bronchitis, and accidents. Mortality-rates are alike the measure of this neglect and of the dissatisfaction it causes; thus the strike ballots taken on the various coalfields, which indicate numerically the miners' collective dissatisfaction with the conditions in the industry, show an order closely parallel with that of the mortality records. Nor does it seem that we have profited much by bitter experience. Prof. Collis considers that in one direction alone—that of social welfare—is any considerable attempt being made to improve the miner's life, and he points out clearly where each set of conditions is at fault and how they may be bettered. Hot food supplied from the pit-head and drinking-water piped to the workings, as it already is in the United States, are needed, he says, to ensure better health and efficiency, for the amount of body-fluid lost at work underground may be anything from one to two pints an hour. In America, where miners are supplied with electric cap lamps, nystagmus is rare; in England it is common, and the large bulk of the patients are users of safety-lamps. Compensation claims for this disease out-number claims for all other industrial diseases taken together, so there is a strong pecuniary as well as a sentimental reason why every effort should be made to improve underground illumination. One of the most urgent needs, however, is the provision of baths at the pit-head. The miner at the end of his shift is black with coal-dust, is tired, and is cold and wet with perspiration. No other worker needs a bath and a change so badly before travelling home. He has to risk catching a cold that may lead to pneumonia and to endure the ostracism of fellow-passengers in public vehicles as the ordinary end to every working day. Even harder, perhaps, is the burden on his wife; she has to prepare the bath, which is taken on the hearth in the living-room, and has to put away the bathing utensils, scrub the floor and, worst of all, to clean and dry her husband's clothes, which are covered with mud and coal-dust, and which soil all they touch. Many children are killed through falling into the hot water prepared for their fathers; one coroner says that he holds more inquests on children dead from scalds and burns than he does on miners who die from accident. Nearly every country but this has laws enforcing the provision of pit-head baths, but British owners, as a whole, still cannot see their productive value, and the men—naturally a conservative class—are only half-hearted in their demands for them. Unfortunately there is also opposition from the wives, and some employers complain that this is the deciding factor. Once clean, the wife argues, my husband can go off to the public-house and never come home till nightfall; I would rather make him come home for his bath and retain some hold over his leisure. Dirt and inconvenience, however, are poor props to domestic life, and Prof. Collis, for his part, considers that provision of baths would probably be a more important reform than any other single measure; besides enormously reducing the incidence of respiratory disease and of the various skin troubles peculiar to miners, they would, he thinks, remove a great deal of the existing inducement to convivial drinking, and thus increase the miner's self-respect. Their introduction, long overdue, together with that of hot food, adequate drinking-water, and improved illumination, would lead to an enormous gain in efficiency and health and thus prevent many accidents, 80 per cent. of which are due to personal carelessness, often the result of some degree of ill-health. They would make happier homes and, by relieving the house-wife of much labour, would reduce the infant mortality. These measures would not be a high price to pay for the removal of a large amount of industrial discontent. It is to be hoped that we shall not long continue to lag behind our neighbours in applying to this most important industry our great national gift for hygiene and preventive medicine.

[1] THE LANCET, March 5th, p. 501.

OBSTETRIC LESIONS OF THE SPINAL CORD.

BIRTH trauma affecting the central nervous system has received increasing attention during the last few years. On this subject the obstetrician, the pædiatrist, and the neurologist find common ground, and the concerted effort which they have made to elucidate its problems may be seen in the writings of Eardley Holland, O. Schwartz, H. C. Cameron, W. J. Adie, and others. This research and controversy has been almost confined to cerebral injury, and whilst current medical opinion attributes to this cause many cases of spastic diplegia which would, some years ago, have been regarded as prenatal in origin, curiously little interest has been taken in the possibility that the spinal cord commonly receives similar injuries. The work now recorded [1] by Dr. Bronson Crothers and Dr. Marian Putnam will have the effect of focusing attention on this aspect of birth trauma. They describe 28 cases of infants and children exhibiting lesions of the spinal cord, in which the evidence of trauma during delivery was in most cases unequivocal, and in all except one extremely convincing. The injury almost invariably appeared to follow traction during delivery. The series is fully described and illustrated by photographs and diagrams interpreting the physical signs. The conventional methods of neurological examination are hard to apply to small children and were largely abandoned in favour of objective observation of the child's behaviour, whilst interpretation of disordered function was in general based on the work of Sir H. Head and G. Riddoch on the action of the isolated cord. The clinical observations are not easily summarised, but the 28 cases fall roughly into two classes. The greater number (17 of those in which the method of delivery was known) were breech deliveries, and version and extraction had been performed in a large proportion of these. One of the breech cases showed bilateral flaccid brachial paralysis with damage of the sympathetic, but the great majority gave signs of diffuse damage to the thoracic cord with partial or complete isolation of the lumbar cord; in a certain number lively reflex activity was observed in the parts below the transection.

The second type of lesion was found in cases of head presentation delivered by forceps. In five out of eight of these the signs pointed to avulsion of brachial nerve-roots with damage to the adjacent part of the cord. It is suggested that one of them may have been the result of resuscitation by swinging. It is significant that in the only case in which labour was known to be normal the evidence of cord injury was not conclusive, the signs being compatible with a lesion of the superior longitudinal sinus, as suggested by Adie. A remarkably small number of these cases were fatal, but in two autopsies the brain was found to be normal, whereas there was extensive hæmorrhage, or crushing, of the thoracic cord. The clinical account of the

[1] Medicine, vol. vi. No. 1, February, 1927.

cases, and the able discussion accompanying them, raises several questions of speculative interest to the neurologist. Of the children having residual paraplegia, conventionally classed as cerebral diplegia, in whom mental development was normal, may not a percentage have been suffering from spinal injury below the cervical enlargement? The extent to which afferent functions persist, or return, in the damaged cord appears to differ in the infant and in the adult; in one child two months old micturition was elicited by nocuous stimulation of a flaccid limb. Observation of further material of this kind should yield evidence on the action of isolated spinal elements and thus supplement information gained during the war. From the practical standpoint Dr. Crothers and Dr. Putnam lay special stress on the apparent liability of traction during delivery to cause spinal damage, and the importance of determining the extent to which traction can or should be avoided. They recognise that this question must be answered by obstetricians, and invite their coöperation in deciding the attitude which should be adopted, on the grounds that "the striking contrast between the apparent incidence of injury and the almost total ignoring of the subject by writers of obstetrical text-books justifies us in suggesting that a definite shift of emphasis is desirable."

SICKNESS AND DISABLEMENT BENEFITS.

AN important section of Sir Alfred Watson's address on National Health Insurance, delivered before the Royal Statistical Society on March 15th, dealt with the claims for sickness and disablement benefits. Among both men and women the claims for sickness benefit fell greatly during the war years; this was particularly the case in regard to women, who in 1916–17 drew less than two-thirds of the sum drawn by them in 1913–14. Since the war the claims for sickness benefit have again risen, but the cost in 1925–26 showed that, on the average, sickness among men was still considerably below the level of 1913–14. Among women the indications are less satisfactory, the figures suggesting that within a short period the earlier level will again be reached. Comparing the sickness experience of a representative sample of men in the years 1921–23 with late nineteenth-century experience, such as that of the Manchester Unity of Oddfellows in the years 1893–97, Sir Alfred Watson remarked on the improvement shown in the health of the community, the "rate of sickness" having fallen on the average by about 20 per cent. He traced this to a large reduction, at all ages, in the proportion of the insured who claimed benefit; among men of ages 40 to 45, 160 in 1000 drew benefit in 1921–23 against 246 in 1000 in 1893–97. The duration of sickness, on the other hand, has increased, the new average at the ages cited being 5·0 weeks per case against 4·3 weeks shown by the older tabulation. Special and not unsatisfactory causes may explain these features; they do not necessarily indicate any real increase in the length of incapacity. Among unmarried women the proportion who fall sick is, as a rule, somewhat less than among men of the same age, but the duration of incapacity is much longer, and on the whole, therefore, the average amount of sickness per insured woman is greater than among men. Among married women, both the number claiming and the duration of the claim are relatively greater than among the unmarried; the duration of sickness benefit in the case of a married woman claimant averages in fact the very high figure of 8¾ weeks. Disablement benefit (which is entered upon when sickness benefit has been paid for 26 weeks) is found to be an increasing quantity among all sections of the insured. This, said Sir Alfred Watson, was expected by the promoters of the scheme as it grew to maturity, and so far as men are concerned the cost is well within the expectation indicated by the older friendly society experiences. The extent of the claims of women in respect of disablement benefit, however, is occasioning some concern. Taking men and women together it is estimated that about 200,000 persons are now permanently disabled and drawing benefit from the approved societies. Sir Alfred Watson went on to explain the seasonal variation of sickness; the claims made in the winter months average from 50 to 100 per cent. more than the summer minimum. The claims for maternity benefit bring out clearly the changes which are occurring in the birth-rate; among the wives of insured men in the years 1919–23 the claims were 88 per cent. of those expected by the financial standard. The birth-rate (compared with the married population at the reproductive ages) has thus fallen by about 20 per cent. since the beginning of the century, while the proportion of the married in the population has substantially grown, the increase in this respect being 20 per cent. at the ages 20 to 25, 10 per cent. at ages 25–30, and 5 per cent. or more in other age-groups. In comparison with the birth-rates among wives of insured men, the great majority of whom are not employed outside the home, Sir Arthur Watson finds the birth-rates among employed married women to be significantly low; the proportion varied with age, being, for example, 69 per cent. at ages 25 to 30 and 61 per cent. at ages 30 to 35. His address, although expressly stated to be a statistical review, was felt to be very enlightening on some of the social implications of our health insurance system.

CONTINUOUS RECORDS OF BODY TEMPERATURES.

PROBABLY few clinicians realise the numerous pitfalls that exist in clinical thermometers until they read of the early struggles and failures of those who were pioneers in the subject.[1] Apart from the experimental work of many investigators who have striven to provide a satisfactory clinical method of recording temperatures, a small body of workers have made, with almost infinite patience, experiment after experiment to obtain continuous temperature records throughout the 24 hours. With these efforts the names of Lombard and Clifford Allbutt, Gamgee and Sims Woodhead will always be associated. Gamgee began with a thermocouple combined with a photographic recording apparatus which consisted of a revolving drum covered with a sensitised bromide paper. Subsequently the evolution of the Thompson-D'Arsonval galvanometer enabled him to advance his methods a stage further. On Gamgee's death, Woodhead, who had previously been interested in the subject, returned to the work and was joined by Dr. P. C. Varrier-Jones. The continuous photographic recorder was discarded in favour of the quasi-continuous Darwin thread recorder with a d'Arsonval galvanometer, an apparatus which gives an inked dot on the revolving paper of a drum at regular intervals. Finally an electric resistance thermometer was devised consisting of a fine platinum wire wound round two strips of mica notched at both sides and the whole enclosed in a silver tube without coming into actual contact with the platinum wire. This thermometer coil is connected by flexible wires (with "compensating" leads) to a Wheatstone bridge on which the resistance can be measured by means of the defection of a galvanometer. As the electrical resistance of the platinum wire varies with the temperature, it is possible, by measuring this resistance, to determine the temperature of the platinum which thus acts as a thermometer. Recording is carried out with the Darwin thread recorder as with the later models of the thermocouple thermometer. Full working details for the use of this apparatus are given in the book. The temperatures are taken per rectum. With the use of this apparatus quasi-continuous temperature records have been made from patients

[1] The Significance of Temperature Variations in Tuberculous Disease. A Study in Continuous and Quasi-continuous Temperature Records of Man and Animals in Health and Disease. By P. C. Varrier-Jones, M.A., M.R.C.S., L.R.C.P., Medical Director, Papworth Village Settlement. Cambridge: Papworth Press. 1926. Pp. 174. 5s.

lying in bed in Addenbrooke's Hospital, Cambridge, whilst the complete recording apparatus was worked in the Pathological Laboratory a third of a mile away. Dr. Varrier-Jones has recently published a historical summary of his work on this subject and of that of his predecessors in a book where he also supplies observations made by himself and by others on the temperature in man and in animals in health and disease. He has applied these observations to the study of the tuberculin reaction in cattle and to the early diagnosis and prognosis of tuberculosis in man, showing how these more accurate methods of recording temperatures assist the physician in detecting the very early signs of activity of the disease. While it is not likely that the quasi-continuous temperature record can be applied on any large scale in clinical medicine, its use may, in the hands of careful and accurate workers, elucidate some of the problems which confront those who have to deal especially with chronic pyrexial diseases. For instance, a comparison is needed between the value of the various laboratory methods for detecting early signs of activity in tuberculosis and the methods of an accurate delicate thermometry.

BENZOIC ACID IN FOODSTUFFS.

THE Public Health (Preservatives, &c., in Food) Regulations, 1925, came into force in January last as regards their main provisions. Boric acid, and to a lesser extent salicylic acid, were the main preservatives used by food manufacturers, but these are now prohibited. On the other hand, benzoic acid is permitted in certain scheduled foodstuffs, provided that the amount present does not exceed the specified limits. Benzoic acid hitherto has not been extensively used for food preservation, and the report by Dr. M. S. F. Monier-Williams,[1] recently issued, is timely as this substance will require more attention from food analysts. The available methods for the separation of benzoic acid from foods involve either extraction of the acidified foodstuff with solvents, and recovery of the benzoic acid by evaporation of the solvent, or steam distillation. In the solvent method preliminary treatment is necessary to remove proteins, fats, and other interfering substances, and to obviate the difficulties caused by the formation of troublesome emulsions. Removal or destruction of proteins is almost always necessary as they are liable to cause emulsions on extraction with solvents, and also to retain benzoic acid. The removal of the proteins by precipitation may lead to loss of benzoic acid in several ways which the author discusses. With foods containing much fat it is probably safer to separate the fat, and to extract benzoic acid independently from the fat and from the fat-free residue. Steam distillation is successful with non-fatty foods if certain precautions are observed. The author describes a new method of steam distillation available for the determination of benzoic acid in fruit and vegetable products. This is based on the observation that benzoic acid is readily and completely volatile in steam when the liquid in which it is present has previously been saturated with salt. This method is described in detail and the quantitative results obtained suggest that it is one of great accuracy for the types of food for which it is proposed to be used. The separation of benzoic acid from volatile fatty acids is a matter of some difficulty. It is only in rare cases that direct extraction yields a product sufficiently pure for titration or weighing, without further treatment. The various purification methods are discussed and sublimation is considered the best and most reliable method. It is evident that the analytical difficulties involved in the determination of benzoic acid are considerable. As regards the tests for benzoic acid, Mohler's test is described as the most delicate, while the ferric chloride test is more characteristic but somewhat less delicate. The most characteristic test is Jonescu's, if we except those which depend on the sense of smell. There is, of course, to be borne in mind the possible occurrence of benzoic acid in nature, but Dr. Monier-Williams has only found it in one edible fruit (the cowberry or red bilberry) to any appreciable extent; certain substances, however, occasionally met with in foodstuffs may give reactions similar to those of benzoic acid, and care is therefore necessary in applying confirmatory tests.

[1] The Determination of Benzoic Acid in Foodstuffs, Public Health Reports, Ministry of Health, No. 39, 1s.

PLASMOCHIN.

IT is now some time since we first recorded [1] the claims made for plasmochin, a synthetic compound produced by H. Hörlein in the Bayer laboratories at Elberfeld and recommended for the treatment of malaria. The drug was obtained by adding various side chains to the quinoline ring which is also one of the essentials in the basis of the quinine molecule. Chemically speaking, plasmochin is ethylaminoquinoline hydrochloride. Our knowledge of its action is really based upon the action of quinine on the *Proteosoma præcox* infection of birds, and the preliminary experiments were performed by W. Röhl on hundreds of artificially infected canaries using as a therapeutic standard the effect of quinine on this plasmodium, which had already been studied. In this way it was shown that plasmochin exerted a parasitotropic action about 60 times greater than that of quinine, and the peculiar fact emerged that plasmochin has a far more rapid and destructive action upon the gametocytes, or sexual forms of the parasites, than upon the immature schizonts. In 1925 F. Sioli began to test the therapeutic action of plasmochin (Beprochin, as it was then called) on lunatic patients artificially infected with benign tertian malaria. The doses attempted ranged from 0·05 to 0·25 g. daily; the latter dosage, however, proved too large. The patients rapidly developed a livid cyanosis of the face, lips, and especially the nails. There were evidently toxic phenomena which, it was thought, could be eliminated by smaller doses. Later in August, 1925, P. Mühlens was able in Hamburg to observe the action of plasmochin upon 134 cases of naturally acquired malaria, and substantiated in the main the specific action of the drug upon the benign tertian parasite. Under its influence the crescents, or gametocytes, of the subtertian form disappeared with great rapidity, but parasitic relapses with schizonts were apt to occur in *P. falciparum* infections, so that the action of plasmochin had to be reinforced with quinine. The best dosage was found to be 0·1 g. daily, given in five doses of 0·02 g. each. At first the drug was exhibited in capsules, but latterly in tablet form. Better results were obtained in subtertian malaria by combining it with quinine. This was known as plasmochin compound; a tablet consisted of 0·01 g. plasmochin with 0·125 g. quinine sulphate, and six tablets were taken daily. During 1926 Dr. P. Manson-Bahr, as related on March 2nd, at a meeting of the Section of Tropical Diseases and Parasitology at the Royal Society of Medicine, treated 18 cases of malaria with plasmochin and 10 with plasmochin compound at the Hospital for Tropical Diseases in London. Exercising great care in clinical observation of the cases, besides making daily examinations of the blood, he has been able to confirm to a great extent the observations already made in Hamburg. In benign tertian infections, he states, a dosage of 0·08 g. plasmochin daily for five days caused rapid disappearance of the parasites with a very rapid reduction in the size of the spleen. In subtertian malaria the crescents disappeared, as a general rule, within four days, but parasitic relapses were very liable to recur with the therapeutic doses mentioned. In the latter infections, also, cyanosis developed in three cases, being associated with methæmoglobinuria in one of them. This curious toxic state is due to the formation of methæmoglobin from the corpuscular

[1] THE LANCET, 1926, ii., 765, 1279.

hæmoglobin, and may be compared to potassium chlorate intoxication. In plasmochin compound, however, the addition of small amounts of quinine seems to counteract these defects, and the results in 10 cases were equally efficacious in both benign and subtertian infections. Dr. Manson-Bahr concludes that plasmochin has to be regarded as the first of a new series of antimalarial synthetic drugs, and not as the climax of what has already been accomplished. The future, he considers, is distinctly hopeful as regards the synthesis of a still more efficient antimalarial compound.

HOSPITAL BEDS FOR THE MIDDLE CLASSES.

PROVISION of hospital accommodation for patients of the professional and middle classes is gradually being made. Many of the great hospitals have either in fact or in preparation blocks designed for paying patients, and other smaller institutions are increasing the number of beds allocated to the middle classes. We have often set out the difficulties which have to be overcome when a charitable foundation created to serve the sick poor accepts patients from another class; these difficulties do not arise when hospitals are designed exclusively, as was the St. Andrews Hospital in Dollis Hill, for the treatment of the professional and middle classes. This admirable institution is now appealing for funds to build a home for nurses and maids outside the hospital building, thus giving space for 12 or 14 more beds for adults and for a children's ward with 12 cots. Another private hospital for the middle classes is being organised in connexion with the Ladies' National Clubs, which provide residential accommodation for many women and girls in London and the South of England. A large house has been secured in South Kensington which is being equipped with a suitable operating room. It will have 34 beds, of which 12 will be in separate private rooms; the men's ward with 4 beds, 3 women's wards with 2 beds in each, and 2 larger wards each containing 6 beds. The prices will range from 4 guineas a week upwards, private rooms costing 6 guineas a week, including maintenance and nursing. The operating room fee is to be a guinea. It is hoped that the institution will be self-supporting, any profit made being used for its improvement or extension. The hospital will be under the supervision of a non-resident medical superintendent who lives near at hand, and will, when necessary, be able to procure for members the services of consultants at fees modified in accordance with the patient's means. In order to be eligible for admission an entrance fee of 10*s*. 6*d*. is payable by anyone who is not a registered member of the Ladies' National Clubs, the subsequent annual subscription being 21*s*. Particulars of how to join the parent organisation may be obtained from the registered office, 11, Cromwell-road, London, S.W.7. It is intended to have a Guest House near the hospital, running in connexion with it, so that friends of patients and members coming to London for medical advice can obtain accommodation there on moderate terms. It is not clear what would be the position if all the beds at the hospital were occupied when an urgent case for admission among the members presented itself, but doubtless the management have foreseen the possibility of this and will provide against it. No mention is made in the literature which has reached us of an X ray room or pathological laboratory; in fact the prospectus gives the impression rather of a moderately priced nursing home under medical supervision, with expert staff available at modified fees, than of a fully equipped modern hospital, which could hardly be a business proposition if run on such a small scale. It will be remembered that an association with much the same aims, entitled the Professional and Business Women's Hospital League, was organised and flourished for some years on less ambitious lines—that is, the members when ill were accommodated by special arrangement in the St. Andrews Hospital, Dollis Hill, or the South London Hospital for Women. This new scheme, however, apparently caters for men as well as for women; it is not stated whether the affluent are ineligible or whether they will be freely admitted to the hospital on the standard terms; presumably the consulting staff will not be asked to reduce fees unless inquiry has been made into the patients' circumstances. We shall watch the development of the scheme with interest.

TOOTH-POWDERS AND PASTES.

IN contemporary dental literature the subject of dentifrices is but seldom discussed. It almost seems as though the dentifrice is becoming an elegant toilet preparation rather than a pharmaceutical product, and that the manufacturers are being allowed to take the initiative in deciding what qualities are requisite in it. A recent paper by Mr. F. N. Doubleday [1] should remind the dental profession that the lead ought not to pass by default to those whose interest is purely commercial, and it also contains an interesting discussion of the ideal preparation. Tooth-paste, he remarks, has largely replaced powder in the public esteem, and he suggests that the desire for a bland preparation has been overdone and that the detergent value of the dentifrice has suffered in consequence. The prejudice against the powder probably dates from the experiments of W. D. Miller, who showed that an abrasive powder might be—and often was—definitely destructive to the teeth. But from the coarse powder we have gone to the other extreme, and the modern tooth-paste, though free from gritty particles which could be harmful, is so smooth that it fails to be detergent. A second reason for the popularity of paste is the convenience and cleanliness of the tubes. Assiduous use of it, however, often fails to whiten the teeth of heavy smokers or people whose teeth are irregularly placed, and there seems to be good reason for Mr. Doubleday's contention that a properly compounded powder is preferable, as a cleansing agent, to a paste. Powder, he points out, should be taken from a sprinkler or bottle, as the supply in a tin may easily become contaminated, especially where several people use a common stock. This latter practice may be the means of spreading infection, for it is very doubtful if the antiseptics in any tooth-powder can keep it sterile in an open tin. The ideal dentifrice should contain a cleansing agent such as precipitated calcium carbonate, which is also an antacid. Sodium bicarbonate may usefully be added as a solvent of the mucus which helps to keep food débris in contact with the teeth. Judging by the analyses made in THE LANCET Laboratories ten years ago [2] both chalk and soluble alkali were present in all popular forms of dentifrice. As to the value of soap expert opinion differs, some writers advocating a content of 25 per cent., whilst H. Prinz would limit it to 2 or 3 per cent. to avoid damage to the salivary enzymes. Mr. Doubleday, judging by his prescriptions, agrees with Prinz. As an antiseptic no dentifrice can have much effect on the bacterial content of the mouth; whatever it may be capable of doing in vitro, its constituents are so quickly diluted by the saliva that the action must always be very limited. A taste of antiseptics, however, has a certain psychological value, and as Mr. Doubleday points out, their presence may help to keep the powder free from accidental contamination; if thymol be used it may possibly exert some action on the growth of the leptothrix associated with the formation of tartar. A point on which he lays stress is that a tooth-powder should not be kept for a long time, and should therefore be bought in small quantities. There is, indeed, much to be said for the suggestion that dentists should get in the habit of writing their own prescription for dentifrices. Mr. Doubleday holds strongly that the reaction should be alkaline. Seeing that the organisms concerned in dental caries are acid-lovers and the primary stage of caries is the destruction of the enamel by acid, this

[1] Brit. Dent. Jour., Dec. 1st, 1926.
[2] THE LANCET, 1917, i., 29.

seems rational enough; even if the alkali does not neutralise the acid formed by carbohydrate fermentation it can at least do no harm. The idea that a dentifrice should be acid came from H. P. Pickerill, who stated that acid or sapid food substances caused a free flow of saliva of increased alkalinity, which is, perhaps, the ideal detergent agent. He suggested that an acid dentifrice would act in a similar way, and this theory received considerable support. In recent years, however, Pickerill's observations have been criticised by several observers, notably E. C. Kirk and F. P. Chillingworth, who point out that methyl orange, the indicator he used, is unreliable. Chillingworth[1] came to the conclusion that an acid dentifrice does harm, since it forms an acid plug which seals up fermentable carbohydrate in any dental cavities and so promotes the extension of caries rather than its prevention. It goes without saying that a properly designed tooth-brush and correct brushing are necessary in order that any dentifrice may act to the best advantage. Cross brushing should be avoided, for even with a bland dentifrice it will eventually wear away the necks of the teeth. But if the brush is worked away from the gums, and towards the crowns of the teeth, the interdental spaces are cleaned and the gums and necks are not injured. Without accepting all the claims of the manufacturers it may be said that the dentifrice has a definite, if modest, place in dental hygiene, especially as nowadays the teeth are often irregularly placed, and the diet may lack the detergent elements which cleanse the mouth naturally by causing vigorous mastication.

CELL POISONING BY CARBON MONOXIDE.

THAT carbon monoxide has an effect on other substances present in living organisms than hæmoglobin was shown last year by Warburg, who found that the rate of oxygen consumption of yeasts and of a micrococcus was depressed by the presence of this gas. In a recent letter to *Nature* Mr. J. B. S. Haldane states that he has extended these observations to the wax-moth, *Galleria mellonella*, and to the cress *Lepidium sativum*. The behaviour of the moth in atmosphere containing as little as 2 per cent. of oxygen is normal, but when the proportion is reduced to 0·8 per cent. motion ceases if the other gas present is nitrogen (plus argon). When, however, carbon monoxide is the diluent, 16 per cent. of oxygen is needed for normal behaviour and motion ceases at 8·8 per cent. oxygen and 91 per cent. carbon monoxide. On admitting air recovery is rapid and complete, thus differentiating the action from that on hæmoglobin. Cress seeds, which would germinate in atmospheres containing as little as 1·7 per cent. of oxygen and grow poorly in 5 per cent., but almost at a normal rate in 10 per cent., in mixtures of oxygen and carbon monoxide did not germinate at all under 3 per cent. of oxygen, only a few seeds opened at 7 per cent., and in 14 per cent. growth was slow. Whilst experiments showed that carbon monoxide was relatively less poisonous for cress than for moths or yeasts, Haldane concludes that probably "oxygen before it can be utilised for some at least of the oxidative processes in the cell, must combine with a substance possessing a lesser but well-marked affinity for carbon monoxide, these two gases combining with the same group in its molecule. As this substance is found in higher animals and plants as well as bacteria and fungi, it is probably a nearly universal cell constituent." Warburg found that the compound produced, like carbon monoxide hæmoglobin, is dissociated by light. These observations should be borne in mind in connexion with the more familiar immediate results of carbon monoxide poisoning. The gas is likely to occur in any situation where carbon or its compounds, solid, liquid, or gaseous is incompletely burned. This may result not merely through inadequacy of air supply, but also whenever a flame is cooled unduly. The New York State Department of Labour has called attention in *Industrial Hygiene* for February to the widespread incidence of this gas in works of all kinds. In New York the air of 24 out of 31 garages contained carbon monoxide, whilst in 17 cases the percentage of this gas exceeded 0·1 per cent., which apparently is considered permissible, although it seems unduly high. The blood of 29 out of 42 workers in garages yielded evidence of carbon monoxide short of the clinical symptoms of poisoning. The danger of cellular poisoning arises also in connexion with the use in confined spaces of fire-extinguishers containing carbon tetrachloride, a liquid which, although very efficacious in extinguishing petrol fires, yields carbon monoxide in addition to phosgene, hydrochloric acid, and a variety of other poisonous products.

[1] Brit. Dent. Jour., Nov. 15th, 1922.

MEDICAL REGISTRATION.

UNDER this title a paragraph has been circulated by one of the press agencies purporting to give the views of the Editor of THE LANCET on the scope of the General Medical Council and its penal powers. One important newspaper immediately offered the Editor an opportunity of correction, and the agency has offered to take the same course. It is unfortunate that publicity should have been given in a marked way to a wrong description of the functions of the General Medical Council and of the Council of the British Medical Association, while the words of the speaker, if accurately recorded, would have cleared up exactly the confusion.

THE French Association of Anatomists has arranged to hold its meeting in London on April 11th to 13th, in coöperation with the Anatomical Society of Great Britain and Ireland. The Congress will meet at University College. About 150 members of the two societies are expected; and as the French Society includes members from Belgium, Italy, France, Holland, Switzerland, Spain, Portugal, Poland, and Czecho-Slovakia, the Congress promises to be an international one such as hitherto has not been held in Great Britain. On the evening of the 11th a conversazione will be held at University College. One of the most interesting features of the meeting will be the reception by Mr. Henry S. Wellcome in his Historical Medical Museum on Tuesday, the 12th, from 8 to 11 P.M. On the following evening a dinner will be held at King's College. Arrangements have been made for the members of the Congress to visit Cambridge as the guests of Prof. J. T. Wilson. There will be a trade exhibit dealing with scientific appliances and other technical equipment for anatomical study.

ROYAL MEDICAL BENEVOLENT FUND.—The annual meeting of the members of this Fund will be held at 5 P.M. on Friday, April 8th, at 11, Chandos-street, Cavendish-square, London, W. 1, when the officers and committee for the current year will be elected.

THE LISTER CENTENARY.—The centenary of Lord Lister's birth falls on April 5th, and on Monday, April 4th, the King will receive delegates at Buckingham Palace. There will also be a reception by the Royal Society of Medicine in the evening. The London programme for April 5th includes a reception by the Prime Minister in the large hall of the British Medical Association and a conversazione at the Royal College of Surgeons, whilst on April 6th there will be a memorial service in Westminster Abbey, followed by discourses at the Royal Society of Medicine, and a conversazione at the rooms of the Royal Society. It is announced that the Listerian Society of King's College Hospital has been obliged to change the time of its celebrations from 8 P.M. on Monday, April 4th, to 3 P.M. on the same day. All old King's men and their friends are invited. At Glasgow the Centenary will be kept on April 1st; details of the arrangements have already been published in THE LANCET (March 19th, p. 622). The Edinburgh celebrations will chiefly be held on July 20th, when they will coincide with the British Medical Association's annual meeting. We hope to publish in our next issue a full programme of the arrangements of the following week.

Modern Technique in Treatment.

A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.

CCXVI.

TREATMENT OF ACHALASIA OF THE CARDIA (SO-CALLED "CARDIOSPASM").

II.*—MEASURES FOR RELIEF.

Symptoms.—An individual, who has generally never suffered from indigestion, one day feels that his food is "sticking" deeply below the lower end of his sternum. After a time the discomfort, which rarely amounts to pain, passes away, either spontaneously or after ejection of the food—ejection, not vomiting, as the stomach takes no part in the action, which is unaccompanied by nausea. The food is undigested and alkaline, unless it has been retained sufficiently long to have undergone fermentation, and it is mixed with more or less abundant mucous saliva. The ejection is generally a more or less voluntary action, which the patient often learns to perform whenever the substernal sensation becomes sufficiently unpleasant. The first attack may be followed by similar attacks after every subsequent meal, or there may, at first, be intervals of varying length, but eventually all intermissions cease. The patient learns to eat very slowly and to choose food of fluid and semi-fluid consistence. He slowly loses weight, but finally equilibrium is established, and he is often able to carry on his occupation, though with his strength and energy greatly impaired.

Though the symptoms are very often mistaken for gastritis or some other disorder of the stomach, a carefully elicited history and the examination of the ejected material should exclude such a diagnosis. The only condition giving rise to somewhat similar symptoms is cancer of the lower end of the œsophagus. In this, however, the onset is much more insidious, and the dysphagia gets rapidly and progressively worse without intermission till complete obstruction occurs after a comparatively short time; in achalasia, on the other hand, the obstruction is no greater at the end of ten years than it was at the onset, which is always quite sudden. In cancer loss of weight and strength are generally more rapid, and the condition rarely occurs before the age of 45 or 50, whereas achalasia may occur at any age.

The X rays at once settle the *diagnosis;* the œsophagus is found to be greatly dilated, and, if it is previously emptied by a tube or by the voluntary ejection of its contents, the whole of the opaque meal is seen to accumulate in the œsophagus. In spite of violent, but intermittent, peristalsis nothing passes through the cardiac sphincter till the food forms a column about 8 in. in height, when a fine straight line is seen passing from about the level of the diaphragm to the stomach; this represents the lumen of the sphincter. In cancer the œsophagus is never greatly dilated and the whole of the opaque meal gradually passes into the stomach unless it is ejected, so that no large accumulation occurs. The lumen of the affected part is irregular in width and direction instead of being straight and uniform in diameter.

Occult blood is found constantly in the stools in cancer, but never in achalasia.

Œsophagoscopy is superfluous, as the diagnosis can be made with more certainty and much less unpleasantness by means of the X rays. The passage of an ordinary bougie is dangerous as well as useless, as the lower end of the œsophagus is so dilated that it forms a blind ending, from the left side of which the lumen of the cardiac sphincter passes; consequently a bougie generally misses the sphincter, and, unless great care is taken, it may damage the œsophageal wall. On the other hand, a flexible rubber tube filled with mercury, sufficiently heavy to find its own way without being pushed, passes through the closed sphincter without any appreciable resistance being felt—a further proof that no spasm is present. A growth, on the other hand, always forms an insuperable obstruction to the passage of the mercury bougie.

DILATATION OF THE SPHINCTER.

As it is presumably impossible to restore the power of relaxation to the closed cardiac sphincter, the object of treatment must be to dilate it to such an extent that it no longer offers any resistance to the passage of food into the stomach. This can be done most easily and with least discomfort and danger by means of mercury bougies. Rubber tubes varying in diameter between 33/64 and 46/64 in. (gauge Nos. 28 to 34), 31 in. long, and each containing the same weight of mercury (1 lb. 5 oz.), which has been found by experience to be sufficient to force the closed sphincter, are now obtainable.† It is best to pass the bougies on the first occasion during the X ray examination; it is then seen that they pass without deflection straight into the stomach. A mark should be made on the bougie at the level of the teeth when its two lower inches are within the stomach. Successively larger tubes are passed at a single sitting, and in most cases the largest one meets with as little resistance as the smallest. The patient is then instructed to pass the largest tube on himself before each meal. He finds at once that a meal taken after the passage of the tube enters his stomach without difficulty. For a few days the bougie should be retained in position on each occasion for as nearly a quarter of an hour as possible; then the time is reduced before lunch and dinner, and often, within a week, the midday passage can be given up entirely. Later the bougie is passed in the morning only, and the time it is kept down is steadily reduced. After a time, in favourable cases, the bougie is only passed on alternate days, then once a week, and finally its use is discontinued, but it is kept by the patient so that he can pass it if at any time he feels that some slight obstruction has returned.

Until recently the largest bougie I employed was No. 24; with No. 32, which, in spite of its alarming appearance, causes no more discomfort than the smaller one, improvement is much more rapid. But even with No. 24 sufficient improvement occurred in the majority of cases for patients to be able to discontinue its use after an interval of varying duration; in one patient, who was fortunate enough to have his condition diagnosed correctly on the actual day of the onset of symptoms, the passage of the bougie on a single occasion produced a complete and permanent cure. Another man was able to go through the hardships of four and a half years of active service in the war without any recurrence. Occasionally patients have found it necessary to continue to pass the bougie once or twice a day, but as they quickly get accustomed to it this is no great hardship; however, with the larger tube now in use, this will very rarely be necessary.

Two other methods of dilating the sphincter require mention. That in which a rubber bag is distended by hydrostatic pressure (Plummer's modification of Russell's method) is very painful, and has, on several occasions, led to death by splitting the sphincter. The other method is by forcibly dilating the sphincter by the fingers during a laparotomy; but the dilatation can be carried out equally well by the mercury tube without the disadvantage of an abdominal operation.

In one case of mine Mr. R. P. Rowlands divided the sphincter longitudinally, as in Ramstedt's operation for hypertrophic pyloric stenosis in infants. The patient is still completely well three years after the operation. He was the only patient I have had, in whom the passage of the mercury bougie had not given sufficient relief to enable him to regain sufficient strength to carry on his occupation, but I expect that the larger bougie now in use would have cured him also. The

* Part I., on General Considerations, appeared last week.

† From Messrs. Down Bros., St. Thomas's-street, S.E.

operation demonstrated the complete absence of any hypertrophy of the sphincter, which was 1½ in. in length and constituted the whole of the intra-abdominal part of the œsophagus.

Diet.

The prolonged retention of food in the dilated œsophagus caused by achalasia of the cardia and the frequent production of irritating material as a result of fermentation give rise to catarrh and occasionally more severe inflammation of the mucous membrane. However complete the cure of the achalasia may be, the hypertrophy of the œsophageal walls remains, but the dilatation gradually becomes less, so that the redundant mucous membrane is thrown into deep folds. If catarrh is also present, food tends to be retained between the rugæ and the œsophagitis is likely to persist. It is therefore necessary to give the patient a diet containing no pips, skins, or vegetable fragments which would be likely to be retained; he should chew his food thoroughly, eat slowly, and finish each meal by drinking half a pint of water or milk in order to wash the last traces of food into his stomach. During the first week of treatment it is advisable to give him nothing but four feeds a day, each consisting of one pint of milk, which may contain a beaten-up egg; this is generally quite sufficient to cause a gain in weight of 2 or 3 lb. in an emaciated patient.

Many patients learn to eject the contents of their dilated œsophagus voluntarily. Anyone who can do this should be encouraged to evacuate the œsophagus half an hour after each meal, and then drink half a pint of water and evacuate at once as much of it as possible. As a rule a small quantity of food and a good deal of mucus are still present during the first few days of treatment, but the quantity of each gradually gets less. When there is no longer any residue to evacuate and no water can be returned, the œsophagitis as well as the achalasia of the cardia can be considered to be cured. In very long-standing cases with severe œsophagitis, if the patient is unable to evacuate his œsophagus voluntarily, it should be emptied and washed out with a rubber tube attached to a Senoran's evacuator half an hour after each meal, until all signs of œsophagitis and œsophageal retention have disappeared.

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Special Articles.

THE CAUSES OF INFANT MORTALITY.

A COMPARATIVE STUDY.

THE United States Children's Bureau has long been occupied with comparative investigations into infant mortality, the results of which have appeared in separate reports and scattered papers published during the last few years. Dr. R. M. Woodbury sums up the chief results in a handy volume[1] now before us. As a background to these field inquiries he gives a short survey of the general infant mortality in the birth registration area of the United States and also in New Zealand. The infant mortality-rate for New Zealand (white population only) is well known to be lower than that of any other country. How much of this advantage is due to climate, virility of the race, comparative absence of large industrial undertakings, and how much to the legislative and educative measures in which New Zealand is much to the fore, is not easily determinable. What is, however, clear, is that the climatic factor can easily be exaggerated, and that the large differences observed from place to place either between or within countries are within the power of man to prevent.

Two Main Causes.

The main causes that contribute to these differences are respiratory disease and diarrhœa, and the variations from year to year (which might be taken as some measure of climatic and other extra-human causes) of the latter are much greater than of the former. Dr. Woodbury is concerned with comparisons with his own country; we may digress a little to consider how we stand ourselves. It was noted in these columns a few weeks ago that summer diarrhœa is not the cause of high infant mortality in Scotland. This must not be taken to mean that the Scottish rate from diarrhœal infant mortality is lower than the English. This used to be the case, but is not so now, as is shown by the accompanying graph for which we are indebted to the General Register Office.

The close approach of the curves for Scotland and this country in the last few years and the decline in both may be taken as a sign of the preventable nature of the mortality from this cause in spite of climatic and other epidemiological factors. The secular course of the infant mortality-rate in England and Wales differs considerably from one group of causes to another, but in most groups the most striking feature is the steep decline since about 1900.

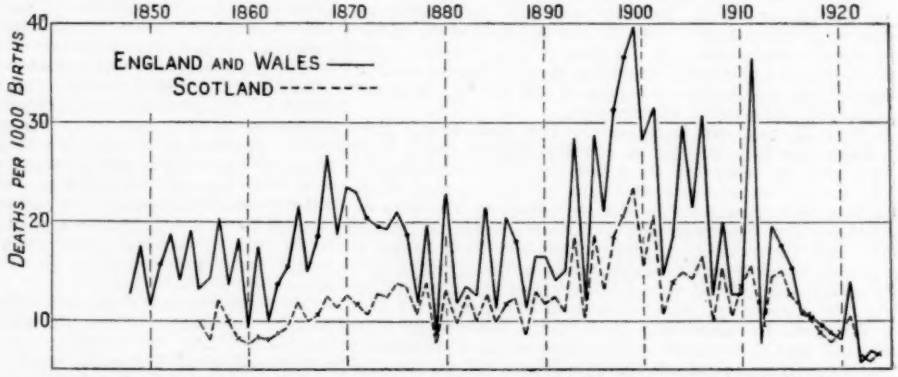


Chart showing the comparative number of deaths from infantile diarrhœa and enteritis in England and Wales, and Scotland over a period of 75 years.

The New Zealand Example.

Dr. Woodbury gives an account of the intensive preventive work that is being developed in New Zealand, and points as a model to the urban area of Dunedin, which with some 1300 yearly births had a perfectly clean sheet as regards infant diarrhœal deaths for three successive years from 1922 to 1924. In New Zealand the problem is fast reducing itself simply to that of deaths in the first month of life, for while in 1924 out of every 1000 births 24 babies died n their first month, only 16 died in the remaining

[1] Infant Mortality and its Causes, by Robert Morse Woodbury, Ph.D., formerly Director of Statistical Research, United States Children's Bureau. Baltimore: The Williams and Wilkins Company, 1926. Agents: Baillière, Tindall and Cox, 8, Henrietta-street, Covent Garden, London, W.C. 2. Pp. 204. 16s.

11 months of the first year. The first month's rate is much the hardest problem—it has been practically stationary there since 1880—but a recent slight drop suggests further possibilities even in these deaths. In the South of England and in London the neonatal rate now approaches that in New Zealand, but as we go north large local increases still appear. As to the rest of the first year even rural districts in the South of England compare unfavourably with New Zealand.

Social Implications in America.

To return to the American field study. This was carried out in eight large industrial cities. The live births within a given calendar year (in every case between 1912 and 1915), 22,907 in number, were followed up by visits to the home, and only those included whose histories could be traced till death or the end of the first year of life. The large number of social and economic factors involved are clearly so closely interwoven that a complete unravelling is hardly to be expected. Age, nationality, and employment of the mother, order of birth, type of feeding, economic status as measured by the father's wages, interval since the last birth and before the next pregnancy, and antenatal and postnatal care of the mother are the main factors considered. In weighing the effect of any one of these, two or three of the others are allowed for by calculating the "expected" deaths on the basis of these classifications. An important point made with regard to artificial feeding is that it showed an apparently cumulative effect during the early months of life. It was less practised in the lower than the higher earnings groups, but seemed to be associated with greater danger in the poorer families.

Deduction from Home Experience.

The findings of the two most nearly cognate recent investigations in this country [2] are not in entire agreement on all points with the American experience. Miss Elderton, for instance, failed to find any evidence that factory employment of women leads to abnormal confinements, while prematurity and increased neonatal deaths appeared to be associated with employment of the American mothers. We are inclined to accept her conclusion that it is never safe to apply the results reached in one district to another district as regards the effect of things so dependent on local conditions as housing and women's employment. It may also be noted that where the same tendencies are found the different methods of analysis used by the American and English authors do not lend themselves to exact comparison of the *amount* of the association.

It is no depreciation of studies such as these to say that they leave us with still uncertain knowledge as to the balance between hereditary constitution and environment and as to the exact relative weight of the different causes and effects of poverty in determining the viability of the infant. Broad lines of attack are well marked out in this country and elsewhere, and we have a long way to go yet in our worst districts before we reach the level that New Zealand has shown to be possible.

[2] The Relative Value of Factors Influencing Infant Welfare, by Ethel M. Elderton, Annals of Eugenics, vol. i., 1925; Study of the Data provided by a Baby Clinic in a large manufacturing Town, by Mary Noel Karn and Karl Pearson, F.R.S., 1922: both issued by the Galton Laboratory and published by the Cambridge University Press.

BIRMINGHAM GENERAL HOSPITAL.—Discussing the decision to create a new hospital centre upon a site given by Cadbury Bros., at Edgbaston, the annual report of this institution states that Dr. J. G. Emanuel, Mr. J. B. Leathes, and Mr. A. H. Leaney, the house governor, are on the continent examining some of the most modern hospitals. Until their report is available no decision upon methods of planning can be reached. The Hospitals Council is working out a comprehensive contributory scheme.

PUBLIC HEALTH IN THE IRISH FREE STATE.

A TRIENNIAL SURVEY.

THE first report of the Department of Local Government and Public Health in the Irish Free State covers the period from April 1st, 1922, to March 31st, 1925, and deals with other branches of local government, such as Parliamentary elections and upkeep of roads, as well as with the public health. Health insurance, lunacy, and the registration of births, deaths, and marriages are to be the subject of separate reports. By recent legislation rural district councils and boards of guardians, with the exception of those in County Dublin, have been abolished and their duties transferred to county councils. The current expenditure on poor relief is now, as a rule, spread evenly over the county area. Public health expenditure and road maintenance are treated in a similar manner.

Administration.

Section 1 deals with general local administration. Under an Act, which became law in March, 1923, the Minister is empowered to dissolve local authorities which are not duly and effectually carrying out their duties, and to appoint in their place one or more Commissioners. A more recent Act prescribes that the period of office of the Commissioners shall not exceed three years, after which a fresh election of members of the local authority will be held. The list of dissolved authorities includes several counties, the Dublin Corporation and Board of Guardians, and the Cork Corporation. The Minister records that all the Commissioners have proved worthy of the trust placed in them.

Infectious Disease.

The public health section, which takes up about 18 of the 210 pages in the report, shows that the notification of infectious disease in many districts had fallen into disuse. In the urban districts there were three cases of typhus in 1923–24, and one in 1924–25, while in the rural districts there were 59 cases in 1923–24 and 49 in 1924–25. The chronic area of typhus infection consists of a limited number of districts on the Atlantic seaboard, "where adverse social conditions, poverty, congestion, and bad housing continue to persist." A considerable outbreak of enteric in Tralee was traced to ice-cream, and two outbreaks of enteric in Dundalk were traced to milk. In the early months of 1924 diphtheria was unduly prevalent in the county borough of Cork. In view of the prevalence of small-pox in England, medical officers of ports have been warned to be on the look-out and vaccination authorities have been advised to be active. One case of small-pox was introduced from London in November, 1923, but there was no spread of infection.

Temporary measures were taken in 1922 to meet the scarcity of qualified public analysts; compliance with the full standard of technical qualifications has now been resumed. Whole-time county medical officers of health and veterinary officers are to be appointed.

Maternity.—School-children.

The county and county borough councils were reminded by circular letter in June, 1923, of their duties as supervising authorities of midwives, and reference is made to the fact that the mortality from puerperal fever and childbirth is disproportionately high in Ireland, and that practically all cases of blindness from birth are due to want of knowledge and skill on the part of those in attendance on the mother and infant. The prohibition of unqualified midwives became operative on Jan. 1st, 1924, and it is urged that in every notified case of puerperal fever there should be careful inquiry as to the character of the attendance. A 50 per cent. national grant is

available for the provision of health visitors and about 130 district nurses are also engaged in this work. County boroughs are being urged to formulate schemes of school medical service, but this matter is not being pressed in the case of counties pending the appointment of county medical officers of health. A school medical service has been begun in the county borough of Cork, where the medical officer has made a general survey of the physical condition of 11,296 children attending 27 elementary schools, of whom 69·9 per cent. were found to have defective teeth, 22·5 per cent. defective eyes, 5·8 per cent. defective nose and throat, 1·8 per cent. defective ears, 9·4 per cent. minor ailments, 11·8 per cent. were unclean, and 8 per cent. showed malnutrition. Clonmel has also inaugurated a school medical service, including an eye specialist and a dentist, with the consent of the Tipperary County Council. During the year ended March, 1925, approved arrangements for the provision of school meals were in force in 16 urban districts, including Dublin and Cork.

Tuberculosis.—The Blind.—Venereal Disease.

Approved tuberculosis schemes have been adopted in 22 counties and in Dublin and Waterford. The recognised sanatoriums number nine, with an aggregate of 815 beds, but these are not all restricted to early cases. Surgical cases of tuberculosis are admitted to 52 institutions, largely general hospitals, and the Irish Sisters of Charity have established a hospital with 70 beds in Dublin County for the treatment of surgical tuberculosis in children. The total number of deaths from tuberculosis in the Free State during 1924 was 4582, and the patients receiving treatment under approved schemes numbered 10,131. It is thought that when the treatment scheme has been fully developed the cases treated will be from eight to ten times the number of deaths.

There are four principal agencies for the welfare of the blind which receive Government grants, three of them in or near Dublin and one in Cork. The schemes which county or county borough councils are required to formulate for the welfare of the blind have not yet been put into operation in any county, but the Commissioners for Dublin have adopted a scheme which came into operation in April, 1925.

The schemes for the treatment of venereal diseases have so far only been resumed in Dublin County Borough and in Dublin, Kildare, and Wicklow counties. During the year ended March 31st, 1925, the total number of patients dealt with at the V.D. clinics was 3174. These patients made 25,991 out-patient attendances and accounted for 7591 days of residential treatment in the hospitals.

The section of the report devoted to poor relief shows that county hospitals have now been provided in nearly all the counties. It is claimed that the placing of the local administration of the Poor-law on a county basis has relieved the burdens of the ratepayers.

Dispensaries.

Section 4 deals with medical charities, and it is therein shown that in March, 1925, there were 588 dispensary districts with a staff consisting of 634 medical officers, 30 apothecaries, and 656 midwives. Since the abolition of the boards of guardians the distribution of free tickets has been carried out by members of the County Board of Health, home assistance officers and wardens, and steps have been taken to prevent the abuse of the free tickets.

The report states that considerable progress has been made in determining scales of salaries for dispensary medical officers, and by March 31, 1925, scale salaries on a county basis were operative in all but seven counties. The following are the average salaries of dispensary medical officers at the several periods mentioned:—1904, £109; 1914, £130; 1924, £251. The real increase is trivial when one compares the cost of living now with what it was in 1914 and 1904. More satisfactory is the fact that dispensary medical officers are now entitled to four weeks' annual vacation, their substitutes being paid out of the rates. The Report goes on to state that, in spite of the disturbances some years ago and the resulting difficulties of transport, the dispensary medical officers and midwives performed their duties to the sick poor with efficiency and sympathy.

Housing.

In Section 5 it is shown that the price of a five-roomed house is about £750, that the rent of such a house should be 8½ per cent. of the capital cost, that the workman cannot pay more than one-sixth of his wages, and that consequently to secure an economic rent the capital cost should be twice the annual wage. This calculation indicates the considerable margin which must be provided from public sources, and one of the first acts of the new Government was to set aside £1,000,000 for urban housing. Municipal authorities are asked to raise a sum of money by a 1*s.* rate, secondly to obtain from local banks or other sources a short period loan equal to three times the produce of the aforesaid rate. That having been done, the Government will make a contribution double the amount raised locally. Thus under the scheme the municipalities will raise £125,000 from rates, £375,000 by loans, the Government will add £1,000,000, and there will thus be available £1,500,000 for the erection of 2000 houses at a total all-in cost per house of £750. Out of the 94 local authorities in the Free State, 71 have adopted housing schemes, and the building costs of the houses have averaged about £600 and £570 for five- and four-roomed houses respectively. The houses are, as a rule, sold on the tenant-purchase system, with a maximum period of 40 years. In the Dublin scheme the purchasers pay from 15*s.* to 16*s.* 6*d.* weekly to cover purchase money, rates, insurance, and all other charges.

Section 17 deals with the scheme of combined purchasing of the commodities required by local authorities. By this scheme many advantages are obtained. Much economy results from the adoption of uniform standards and patterns. A list given in the report shows that the price of an article in the Government contract may be less than half of a similar article in a local contract made in 1922. The small purchaser under the new system buys under the same favourable terms as the large. Under this scheme certain articles have been manufactured in Ireland for the first time.

The Report, as a whole, is evidence of a great variety of work carried out with success in difficult conditions. It is to be hoped that, in future issues, it will be possible to furnish a greater volume of statistical information, even if the Report is not allowed to swell to the bulk of the pre-War Reports of the old Local Government Board.

ROYAL INTEREST IN HOSPITALS.—The sympathetic interest taken by the Royal Family in all matters relating to hospital has been further illustrated. Recently the Queen laid the foundation-stone of the Nurses' Home at the Metropolitan Hospital, Kingsland-road. This institution, which has 137 beds, sets aside two wards, with Kosher kitchens for Jewish patients, and there is also a children's ward. Hitherto the 75 sisters and nurses have been inconveniently and uncomfortably lodged in detached and dilapidated houses full of passages so dark that they have to be lighted continuously.—Princess Mary attended a reception given by the Lady Mayoress at the Mansion House in support of an appeal for £100,000 made by the British Hospital for Mothers and Babies at Woolwich. It is desired to add a second wing to the present buildings with four large and four single-bed wards, two operating theatres and two nurseries, and to build a nurses' block with 30 bedrooms and dining and lecture halls, and a students' block with accommodation for 50 students. It is hoped then to offer a full two years' course in midwifery, free to at least ten students. The hospital, founded in 1749, was the first maternity hospital in London, and was also the first to train students in midwifery.—Princess Arthur of Connaught has opened an extension of the Nurses' Training Home of the Essex County Nursing Association, Leytonstone.

SMALL-POX AND VACCINATION.

AMERICAN VIEWS AND PRACTICE.

IN a recent article[1] Surgeon J. P. Leake, of the United States Public Health Service, sets out to answer a number of questions about small-pox, which he describes as the disease most completely preventable by public health measures. He selected the questions because they are frequently asked by medical men, and though some of the answers are necessarily tentative, they deserve wide publicity.

Technique of Vaccination.

The best method of vaccination is, he considers, the following :—

The skin is cleansed with acetone and is inoculated by shallow tangential pricking with a needle through a drop of small-pox vaccine covering an area not greater than one-eighth of an inch in diameter. The needle must be new, sharp, and sterile. It is not thrust into the skin, but is held parallel to it, with the forefinger and middle finger of the right hand above the needle and the thumb below, the needle pointing to the operator's left.

The side of the needle point is pressed firmly and rapidly into the drop about 30 times within five seconds, the needle being lifted clear of the skin each time. This rapid to and fro motion of lifting the needle and pressing it against the skin should be perpendicular to the skin and needle, and not in the long axis of the needle. The point is not driven into the skin, but during each descent the elasticity of the skin will pull a fraction of an inch of the epidermis over the point of the needle, so that the vaccine is carried into the deeper epithelium (cuboidal prickle-cell layer), where multiplication takes place most easily.

If the skin has not been unduly rubbed in cleansing, and if the motion is entirely perpendicular to the needle, no signs of bleeding will occur, and all evidence of the punctures will fade out in less than six hours. Immediately after the punctures have been made the remaining vaccine is wiped off the skin with sterile gauze and the sleeve pulled down, the whole operation of puncturing and wiping taking less than ten seconds.

With strong vaccine a single pressure not infrequently gives a "take." When 30 pricks are made the percentage of "takes" is as high as with any other safe method. For primary vaccinations where the mildest possible "take" is desired, and where the attempt may be repeated if needs be, the number may be reduced to ten or even to one prick.

The disadvantages of the method, says Dr. Leake, are (1) that the proper pressure may not be easily gauged at first, and (2) that the area covered may be too large. If the needle is held at a tangent to the curve of the arm and if the direction of motion is quite perpendicular to the needle, it is difficult to make the rapid pressures too firmly. Motion from the wrist with the arm held rigid is usually more accurate than whole-arm motion. The advantages of the method are (1) its mildness and painlessness, (2) its rapidity, (3) the fact that no control site is necessary, and (4) the immediate wiping off of the vaccine which makes the patient realise that no dressing is needed. The ideal after-treatment is to keep the site cool and dry, so as to promote rapid formation of a firm crust and to avoid maceration and rupture of the vesicle. A fold of sterile gauze may, if necessary, be attached to the garment, but not to the skin. Occasionally a severe "take" may require a few days of antiseptic dressings, and primary vaccinations should be inspected about the fourteenth day to insure that desiccation is proceeding properly.

As regards *site* Dr. Leake objects to vaccination on the leg, because the leg is more exposed to moisture and contamination than is the shoulder. On account of blood stasis, primary leg vaccinations in adults often heal slowly and cause temporary disability. Vaccination scars on the arm leave only a "sanitary dimple," if performed as recommended.

Other methods.—Any method is satisfactory which ensures that the vaccine is deposited in the deeper layers of the epidermis over an area not more than one-eighth inch in diameter, and avoids poulticing the developing vesicle. Intracutaneous injection of diluted vaccine virus is painful and even in good hands will often be subcutaneous, which makes it hard to interpret the results.

Reactions following Vaccination.

Dr. Leake states that with a reaction of immunity, which indicates full protection against small-pox, the broadest redness is reached and passed in 8 to 72 hours after vaccination. With the accelerated or modified vaccination or vaccinoid, which indicates partial immunity, the broadest redness is reached and passed in three to seven days after vaccination. With a typical primary vaccination, indicating absence of immunity to small-pox prior to this vaccination, the zone of redness, rather narrow from the third to the seventh day, begins a sudden spread about seven days after vaccination and reaches its broadest diameter in eight to fourteen days after vaccination, rapidly disintegrating and disappearing thereafter. These three types merge into each other, all gradations being found in practice.

"The prompter the maximum the higher is the immunity. Vesicles are formed in vaccinoid and typical vaccinia reactions, but not with the reaction of immunity. . . . All three of the types are successful vaccinations provided the small-pox vaccine was fresh and strong. All three not only indicate the grade of the previous immunity, but increase the immunity as well. All other results, where proper technique was used, indicate deficient vaccine. Every vaccination should give a reaction."

The presence of a red, slightly raised area at the site of vaccination 48 hours after vaccination is performed, does not necessarily indicate that the person vaccinated was immune to small-pox, because:

(*a*) The vaccine used may have been weakened by time or temperature.

(*b*) Accelerated reactions (vaccinoids) usually give on the second day the appearance described above, which is similar to that of a reaction of immunity. Thus, even if an early reaction is seen, observation about the fifth or seventh day is necessary to determine whether the reaction was that of immunity, with its maximum diameter of redness reached in less than three days, or an accelerated reaction (vaccinoid) with later maximum. Even a vaccinoid reaction, however, indicates some immunity.

(*c*) The trauma due to the mere mechanical act of vaccination may cause enough irritation so that the redness persists at the time of the early 48-hour observation, independently of any specific reaction. The "multiple pressure" leaves no traumatic reaction after six hours to obscure faint reactions of immunity.

Thus, to sum up, the grade of immunity is not indicated by the amount of reaction, but by the *time* within which the local area of redness and infiltration of the skin reaches its maximum and begins to subside. The quicker the maximum is reached and passed the higher is the degree of immunity indicated. The *amount* of the reaction depends on the skin reactivity of the person vaccinated, and not on the grade of immunity. Probably any reaction which is marked within 24 hours will reach its maximum in less than 72 hours, and therefore would constitute an immune reaction, but some of the most highly immune persons give the smallest reactions.

A failure to "take" does not indicate protection, for differences in skin receptivity may occur independently of the true immunity. For example, very young infants are not as easily vaccinated as older children, and some individuals may be resistant to a lot of vaccine which "takes" generally in other individuals, without, however, being immune against small-pox.

Treatment of Sequelæ.

Where secondary infection occurs the vesicle becomes purulent and extends. As soon as a fair-sized areola has formed the maximum immunity has been attained and the use of an antiseptic will not diminish

[1] Public Health Reports, vol. xlii., No. 4, Jan. 28th, 1927.

the protection. In general, temporary moist dressings are preferable to powders or ointments.

True generalised vaccinia practically never occurs, though morbilliform or erythematous eruptions are common about the time of the maximum reaction. They disappear without treatment.

Times of Vaccination and Duration of Immunity.

Vaccination of infants, says Dr. Leake, is attended with less general reaction and fewer complications than vaccination of older children. It is, therefore, best done as soon after birth as practicable, preferably before teething. There are four advantages to be gained by early vaccination: (1) the "take" is apt to be mild; (2) it tends to make the secondary vaccination, required at school age, a much less serious affair than if the school vaccination were primary; (3) protection against small-pox is gained for the pre-school years; (4) the scar of an infantile vaccination fades more completely than scars of primary vaccinations performed later.

The immunity afforded is lost by different individuals at different rates. Some need to be vaccinated more often than once in five years to maintain full protection; others may be vaccinated less frequently than once in 20 years and still maintain high immunity. A primary vaccination with one successful revaccination, or even a single successful vaccination, will, as a rule, protect throughout life from the milder forms of small-pox, but this is far from being true in the severer outbreaks. Second attacks of small-pox are rare, but do occur. If there is danger of exposure to a severe form of small-pox, all persons who have not been vaccinated within one year successfully—that is, with vaccine known to be of full potency—should be vaccinated. Successful vaccination performed on the day of exposure to infection will almost always give complete protection against small-pox, and vaccination up to a few days before the onset at least makes the attack milder than it would otherwise have been. Vaccination during the few days before onset will allow the vaccination and small-pox eruption to develop simultaneously without either influencing the other.

Epidemiology.

In conclusion, Dr. Leake points out that outbreaks of small-pox occur of all grades of severity, some with a mortality of 70 per cent. among those attacked and some with a mortality of 0·01 per cent.

"Since 1896 a mild form has been increasingly prevalent in the United States and countries in communication with the United States, having a fatality of about 0·1 per cent. among the unvaccinated. The strains of the disease present just previously had been much more severe, and from time to time outbreaks are now occurring with a fatality-rate of about 30 per cent. in the unvaccinated. Each of these strains in general breeds true to its respective type, and mild cases contracted from severe give rise in turn to severe nd fatal cases. There is no definite grade of severity or of fatality that we can consider characteristic of small-pox, and it is probable that almost all of the epidemics called "alastrim," &c., have been mild forms of small-pox. All forms of small-pox immunise against each other and all may be prevented by the same vaccination. Exposure to a severe form is much more likely to give rise to infection than exposure to a mild form, and it takes a higher grade of vaccinal immunity (more recent vaccination) to protect against a severe strain than against a mild strain.

In moderately well-vaccinated communities, such as Germany, epidemics of mild type are entirely prevented, and outbreaks of severe type much diminished. On the other hand, in poorly vaccinated communities, where isolation is nevertheless practised, such as England and the greater part of the United States, mild strains spread more diffusely than severe because they are not taken so seriously by those attacked nor by the public at large, and because the attack is not severe enough to keep the patient in bed and isolated. The mildness of the form of small-pox commonest at present is one reason for endeavouring to make preventive vaccination as harmless and as mild as possible."

Dr. Leake closes a valuable summary by pointing out that epidemics cannot be stopped by isolation without vaccination.

Public Health Services.

MENTAL HOSPITAL REPORTS.

REPORTS of work done last year in Scottish Mental Hospitals are reaching us with commendable promptitude.

The *Royal Edinburgh Hospital*, Morningside, is always in the van of progress, and its 867 patients have every possible opportunity of recovery. The great majority of them are on a voluntary basis, and the medical superintendent voices his protest at the ridiculous law which makes it a misdemeanour to treat voluntary patients in rate-aided institutions. "Strange as it may seem," he remarks, "the existing Lunacy Laws . . . seem to have been devised with the perverse object of obstructing anyone desiring to obtain medical relief. . . . No one can be admitted to a public mental hospital until his disease has become thoroughly established or his conduct has become a public nuisance or a scandal. Even then he is not permitted to receive treatment till his application for admission has been dealt with after the manner of the detention of a criminal." All concerned in this work will agree with his dictum that "such a method of treating a sick person and of handling a question of public health is cruel and an abomination to anyone inspired by medical sentiments and ideals." An outstanding event of the year at Morningside was the opening of a country nursing home for patients with nervous ailments. For the poorer patients the managers have converted a block into a psychopathic hospital for 50 people; this is almost ready for use. Very shortly the building of a new out-patient wing will be commenced; here it is hoped to hold a free daily psychiatrical clinic. The mental out-patient clinic at the Royal Infirmary has been attended by 180 patients since it was opened 12 months ago, and is doing inestimable work in the homes of its patients as well as within the infirmary building. The occupational therapy department continues to perform invaluable services, while the cinematograph and wireless often excite interest in apparently hopeless cases.

The *Glengall Hospital* at Ayr houses 600 patients, and showed a recovery-rate for 1926 of 36 per cent. men and 40 per cent. women, with a death-rate of 14 per cent. The most notable feature among the new admissions was the improved standard of general health—the best ever recorded—while the proportion of senile cases dropped from 20 per cent. to 7 per cent. The death-rate from general paralysis of the insane was remarkably high—45 per cent. men and 9 per cent. women. The medical superintendent ascribes the record increase to greater sexual incontinence following over-reliance on antisyphilitic treatment and the use of contraceptives. There were only two deaths each from cancer and tuberculosis. Apart from mild epidemics of measles and gastro-intestinal catarrh, the general health of the community was good. A number of patients had parole within and beyond the grounds. Five nurses and four attendants obtained their M.P.A. certificate during the year.

The *Stirling District Mental Hospital* had a slight increase in the number of inmates (850) during the year ending May, 1926. The board is also responsible for 102 boarded-out cases, 144 mental defectives, and 82 patients in Poor-law institutions. Twelve voluntary patients were admitted during the year, and eight of them were rate-supported. There was a recovery-rate of 39·3 per cent. and a death-rate of 11·7 per cent. Twelve of the fatal cases were general paralytics. Twenty-one patients were sent out on trial and all were able to stay at home. There were no epidemics. The new reception hospital is in use for recent cases; operating and dental rooms have been equipped, and apparatus installed for X ray, high frequency,

and ultra-violet light treatments. The dental surgeon visits weekly. Among the works in progress are the installation of modern cooking appliances and the preparation of a convalescent block. The purchase of Kinnaird Estate and Kinnaird Hill Farm has supplied the hospital with two-thirds of its milk and 2500 eggs, as well as other farm produce, and has provided occupation for many patients. Infirm, sick, and recent male patients are nursed by women. Eleven of the staff gained their M.P.A. certificate during the year.

The *Aberdeen Royal Mental Hospital* records a satisfactory year of work in 1926, with an average of 800 patients resident, including 33 voluntary boarders. There was a recovery-rate of 31·29 per cent., and a death-rate of 6·65 per cent. During the summer four large verandahs for open-air treatment were completed, and later the electrical department was fully equipped with X ray, diathermy, and mercury-vapour apparatus. Considerable benefit seemed to follow the sunlight treatment. 254 patients were seen during the year by the visiting dentist. In the craft department a great variety of work is undertaken; and an operating theatre has been equipped.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED MARCH 12TH, 1927.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 412 (last week 529); scarlet fever, 1205; diphtheria, 966; enteric fever, 36; pneumonia, 2379 (last week 3375); puerperal fever, 37; puerperal pyrexia, 125; cerebro-spinal fever, 17; acute poliomyelitis, 11; encephalitis lethargica, 32; dysentery, 7; ophthalmia neonatorum, 147. No case of cholera, plague or typhus fever was notified during the week.

The drop in small-pox returns is due principally to the much smaller number notified (176) from the County of Durham. 110 cases were reported from Wales and Monmouth, the position on March 14th being that 363 cases of small-pox had been ascertained in Monmouthshire, 288 of these belonging to Abersychan, and 18 to Blaenavon in the Eastern Valley, while 27 came from Abercarn and the Western Valley. A case is reported from Abergavenny Rural District, but otherwise the epidemic is still confined to the industrial valleys. On the date mentioned 99 cases had been removed to isolation hospitals belonging to various district councils.

Deaths.—In the aggregate of great towns including London there were no deaths from small-pox, 1 (0); from enteric fever, 72 (1) from measles, 8 (1) from scarlet fever, 81 (14) from whooping-cough, 43 (10) from diphtheria, 34 (10) from diarrhœa and enteritis under two years, and 572 (49) from influenza. The figures in parentheses are those for London itself. The Registrar-General remarks that influenza, which was increasing almost uniformly in different parts of the country until the week ended Feb. 5th, is now decreasing generally except in Wales, and it would appear that the worst phase has been passed. For the week ended March 19th the influenza deaths show further substantial diminution, the figures being for the great towns 342, for London 33, Manchester 27, Birmingham 19, Newcastle-on-Tyne 15, Liverpool 14 and Wigan 13.

Influenza in Scotland.—The Scottish Board of Health reported on March 16th that in most parts of Scotland the influenza epidemic was definitely on the wane except in the counties of Fife and Ayr and in Orkney. The source of infection in Orkney appeared to be a farmer who had recently returned from the south, evidently in the last days of the incubation period. He fell ill within 24 hours of his return and was visited by a considerable number of other farmers seeking information as to his business south. All of them, with one exception, subsequently fell ill with influenza. In a few places on the mainland outbreaks of influenza and of whooping-cough occurring at the same time had interfered gravely with school attendances for a number of weeks, sometimes necessitating the closing of schools. The bulletin of March 23rd notes the final strongholds of the epidemic in Fife and the extreme south-west corner of the country. Elsewhere the epidemic is rapidly dying out.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdr. D. D. Turner is placed on the Retd. List with the rank of Surg. Capt.

ROYAL NAVAL VOLUNTEER RESERVE.

Prob. Surg. Lt. R. J. Matthews to be Surg. Lt.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. and Bt. Col. J. A. Hartigan is apptd. Hon. Physician to the King, vice Maj.-Gen. O. L. Robinson, late R.A.M.C. (retd.).

Lt. W. V. Harke, late T.A., Res. of Off., to be Temp. Lt.

W. T. Baker to be Temp. Lt.

TERRITORIAL ARMY.

Lt. A. Badenoch to be Capt. (Prov.).

Lt. D. A. Davies, late Welsh Guards, S.R., to be Lt.

2nd Lt. D. J. MacMyn, from the Gen. List (unposted) T.A., to be Lt.

REGULAR ARMY RESERVE OF OFFICERS.

Col. A. H. Morris, late R.A.M.C., having attained the age limit of liability to recall, ceases to belong to the Res. of Off.

ROYAL AIR FORCE.

A. L. St. A. McClosky is granted a short service commission as a Flying Officer for three years on the active list, and is seconded for civil employment at the Princess Alice Memorial Hospital, Eastbourne.

R. Thorpe is granted a short service commission as a Flying Officer for three years on the active list.

Flight Lt. V. R. Smith is promoted to the rank of Squadron Leader.

Flying Officer D. B. Smith is promoted to the rank of Flight Lt.

Temp. Lt. P. M. Margand (General List, Army, Dental Surgeon) is granted a temporary commission as a Flying Officer on attachment to the R.A.F.

INDIAN MEDICAL SERVICES.

Majs. G. E. Malcomson, H. W. Acton, V. B. Green-Armytage, A. N. Dickson, A. J. H. Russell, R. E. Wright, Dewan Hakumat Rai, F. A. Barker, and A. N. Thomas to be Lt.-Cols.

Lt. T. J. Davidson to be Capt.

Maj. J. J. Harper Nelson has been appointed Professor of Medicine, King Edward Medical College, Lahore; Lt. A. P. Lopez has been appointed to act as Civil Surgeon, Jessore; Maj. S. D. Billimoria has been posted for Civil Duty under the Punjab Government; Lt.-Col. D. Heron has been posted as Residency Surgeon, Mewar; and Dr. I. E. Sweeby has been posted as Junior Assistant Surgeon and Quarantine Medical Officer, Bushire. The services of Lt.-Col. J. Morison, Assistant-Director, Haffkine Institute, Bombay, have been placed at the disposal of the Government of Burma, and the services of Maj. E. S. Phipson, Maj. A. H. Harty, and Capt. J. M. Shah have been placed at the disposal of the Government of Bombay. Capt. H. B. Rosair has been confirmed as Superintendent, Central Prison, Fatehgarh, consequent on the retirement of Rai Bahadur Lala Mithan Lal. Col. H. Ainsworth has been nominated by the Governor to be a member of the Bihar and Orissa Legislative Committee, and Lt.-Col. I. M. Macrae has resigned his membership. Lt.-Col. W. O. Murphy has become Colonel, vice Col. J. H. MacDonald, retd. Capts. H. A. Khan and Malik Anup Singh have been created Majs. Lt.-Col. G. Hutcheson, civil surgeon, United Provinces, has been appointed Inspector-General of Civil Hospitals and Prisons, Assam, in succession to Col. C. H. Bensley. Col. Hutcheson, on return from leave, has also been appointed special officer in connexion with the Leprosy Dispensaries Scheme. Lt.-Col. M. N. Chaudhri retires from the service.

ROYAL FREE HOSPITAL.—For the first time this hospital has a credit balance, which amounts to £16,000. The whole of the money is, however, needed to pay off the debts of previous years.

A NEW CLINIC AT PAISLEY.— On Saturday last Princess Mary opened the Russell Clinic at Paisley, which has been given by Mrs. Agnes Russell in memory of her two brothers. The clinic is divided into two portions, one under the supervision of the Town Council, dealing with tuberculosis, maternity matters, &c., and the other under the control of the Education Authority. The building contains a gymnasium and baths for cripple children, dental rooms, X ray and ultra-violet ray apparatus, and all the most modern arrangements for the curative treatment of juvenile ailments.

Correspondence.

"Audi alteram partem."

VENEREAL DISEASE IN THE MERCANTILE MARINE.

To the Editor of THE LANCET.

SIR,—Having spent over six years at sea, in more than a dozen steamship companies, there has been opportunity to note both the large number of cases seen of venereal disease among seamen and to deplore that something is not done to modify what is an ever-present evil.

Examination of Crew.—Before signing on this is supposed to be done by the ship surgeon. I have never forgotten the words used by the Board of Trade official on more than one occasion to me: "You might 'look' these men over, doctor." Of course too often this "looking over" is a purely perfunctory affair, with the result that men are signed on who, though not apparently unfit, soon make their appearance at the dispensary.

Inspection in Foreign Ports.—This also is a formality. Men are drawn up in a line and ship surgeon and port doctor pass rapidly along, in haste to get it over and obtain pratique.

The object of this letter is principally to suggest an aid in the matter of dealing with venereal disease while in foreign ports. Statistics are given showing the benefit of early prophylactic treatment of cases in the United States Navy during the first 12 hours after possible infection. Immediate treatment could hardly be carried out on board merchant vessels, where the surgeon is usually single-handed, but it should be obligatory on all men who have exposed themselves to infection to present themselves at the dispensary the following day for prophylactic treatment. In addition a notice should be placed in all fo'c'stles drawing attention to the danger run by men when in foreign ports: the danger of promiscuous use of towels, pipes, shaving gear, tobacco-pouches, and even tooth-brushes. The danger of inefficient treatment should also be drawn attention to, as I know from experience that men will often seek the aid of a chemist rather than report to the surgeon. There are then too often disastrous consequences from wrong treatment, or advice from a man who is simply out for profit. Capsules are sold at extortionate prices, and injections are dispensed with no knowledge of the strength to be used or suitability of the remedy. Again, there is the untreated man, who becomes a source of grave danger on his arrival home.

I am, Sir, yours faithfully,
L. L. BURTON, M.D., F.R.C.S.

Dargaville, New Zealand.

EXCISION OF THE METATARSAL HEAD.

To the Editor of THE LANCET.

SIR,—Like Mr. George Perkins, whose summary of the results of excision of the metatarsal head, hallux rigidus, &c., I have read with interest in your issue of March 12th, I have found that although the patients have expressed satisfaction with the result of this operation, the condition as regards both comfort and function has not been quite satisfactory to the surgeon. Ten years ago I removed the metatarsal heads for double painful bunion in a member of my household, and seeing the result daily over a period of years has made it clear that removal of the head of the bone has reduced the stability of the feet to a not inconsiderable extent. The patient has to "pick her way" on irregular ground, has to keep the flexors of the four outer toes contracted, and so utilise these toes in place of the absent metatarsal head (or else be reduced to a plantigrade gait), and is no longer fit for long tramps as formerly.

For the past eight years I have treated all cases of bunion and hallux flexus by excising at least ½ in. of the proximal end of the proximal phalanx of the great toe, and removing exuberant bone from the upper and outer aspects of the metatarsal head with bone forceps. The results of this operation have been definitely better than of the orthodox excision of the metatarsal head, and I can, with confidence, recommend it for all conditions of arthritic deformity of the great toe.

I am, Sir, yours faithfully,
JAMES PHILLIPS.

Bradford, March 19th, 1927.

CAN TAR CAUSE PULMONARY CANCER?

To the Editor of THE LANCET.

SIR,—I have read with interest Dr. Robert Hutchison's letter in your issue of March 19th on the likelihood of tar being a cause of pulmonary cancer, and from 40 years study of cancer I think it is a very feasible hypothesis. Two cases of pulmonary cancer that I have lately encountered would tend to bear this out—both in females, aged 76, both for years had been emphatic in their enjoyment of the warmth of an anthracite, iron, enamelled stove in their bedroom, and both must, therefore, have inhaled for many hours at a time the tarry vapours and dust incident to this method of bedroom heating. The effect of such deleterious inhalations is desiccation of the mucous membranes, and then atrophy of the mucous glands, which are specially abundant on the posterior surface of the trachea and in the larger bronchi. This exposes the denuded mucous membrane to irritation from the tarry and dusty fumes.

It is difficult to understand how the persistent local application of tar can bring about epithelioma in a tissue, but my opinion is that it does so by dissolving out the thin layer of mucin that encases every cell, separating one cell from another, no matter how closely they are packed, even when so approximated as in the cutaneous tissues, thus allowing the individual cells to rub shoulders, so to speak, and thus an attrition of cells arises and cell division is set up with its dire consequences of infiltration, dissemination, and metastasis.

I am, Sir, yours faithfully,
WM. STUART-LOW, F.R.C.S.

Wimpole-street, W., March 22nd, 1927.

THE PATENTING QUESTION.

To the Editor of THE LANCET.

SIR,—We desire to make the strongest possible protest against the article on the Patenting Question in your issue of March 12th, in regard to the specific reference to the patent of Herrmann and Fränkel (E.P. 113,311). As proprietors of the patent in question we are in a position to throw some light on the matter, relying upon your courtesy to publish these comments in your esteemed journal.

For ten years we have been manufacturing according to that patent an ovarian preparation, "Sistomensin," and are selling it also in Great Britain through our concessionaires, the Clayton Aniline Co., Ltd., London, in any required quantities; the prices fixed by our concessionaires are considered by everybody to be fair and reasonable. The reproach that through not granting a licence for this process we prevent the introduction of potent preparations is unjustified, because of the very fact that Sistomensin itself is recognised to be a potent preparation, as irrefutably shown by a considerable number of spontaneous scientific publications emanating from leading hospitals as well as from private practitioners, without mentioning the innumerable unpublished reports and communications from members of the medical profession. We shall be glad at any time to submit this documentary evidence to your perusal.

We may add that our product is standardised physiologically by the recognised and approved

method of the uterus growth. An experience of several years has shown that the growth test runs parallel with the clinical action. On the other hand, the œstrus test discovered by Allen and Doisy, and on which the interest of the scientific world is just now focused, is a new feature. Its parallelism with the clinical action has not yet been demonstrated, and it would be premature to standardise ovarian preparations exclusively by that method, the more so as authors do not agree as to the real interpretation of rat or mice units. Laqueur considers the proœstrus stage as typical, while others consider only the final stage (where cornified cells dominate the picture) as a positive reaction. Under these conditions it is clear that enormous differences exist in the appreciation of the value of preparations. Furthermore, the number of such units that are necessary to exhibit a therapeutic effect has not been determined. Another point is that the question of the unity or plurality of the ovarian hormones is not yet cleared up. Certain authors assume the existence both of an œstrus hormone and of a growth-promoting hormone; others advance the opinion that both hormones are identical. Laqueur points out that his œstrus hormone is inactive when administered by the mouth, and from the fact that other ovarian preparations exhibit an action when administered internally he deduces the presence of other hormones. This shows sufficiently that considerable confusion prevails on the subject. Apart from the fact that Sistomensin is standardised by the uterus growth method, it may be stated that it also produces the œstrus test. Consequently we feel bound to contradict the statement that none of the commercial material obtainable in Great Britain produces œstrus when injected into female rats.

In conclusion, may we state that we feel justified in asking why these inaccurate statements should be made in connexion with the particular product, for the process of extraction of which we are the patentees.—We are, Sir, yours faithfully,

SOCIETY OF CHEMICAL INDUSTRY IN BASLE,
(Signed) J. BRODBECK,
Basle, March 16th, 1927. G. ENGI.

THE PENALISATION OF THE TUBERCULOUS.

To the Editor of THE LANCET.

SIR,—The ventilation of this subject is overdue. If one pauses to consider the advances in the treatment of tuberculosis which have been made during the last 30 or 40 years one must admit that the benefits of treatment, such as they are, have been brought about by individuals who have themselves suffered from tuberculosis. I may mention in this particular two names, those of Saugman and Dettweiler. I cannot say much about the conditions in this country because the persons concerned are still alive; but certainly the first and the best-run sanatoriums in this country were started by persons who had themselves been afflicted with this disease, in some cases, as I happen to know, very severely. The faults of existing public sanatoriums are due largely to management by persons who know nothing first hand of this insidious malady. The first requisite for a person who has the running of a sanatorium is surely that he should believe that he can cure his patients; and if this is so it follows that anyone who rejects, as a sanatorium doctor, a person who has been treated successfully for tuberculosis should not be allowed to treat tuberculosis. If tuberculosis authorities will not employ their ex-patients, who can be expected to do so? And if they are to be debarred from getting employment, what is the use of treating them? I do not imply that doctors should combine an attempt to cure themselves with an appointment of any kind; I am referring to those who have taken the trouble to get well. Such persons should not have to hide their health record from committees and the like.

I am, Sir, yours faithfully,
March 21st, 1927. ERADICATION.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

DISEASES OF ANIMALS BILL.

Mr. GUINNESS, Minister of Agriculture, in moving the second reading of the Diseases of Animals Bill said that Clause 3 would allow the slaughter of imported animals at the port which were found to be suffering from such a disease as tuberculosis on the order of an official of the Ministry of Agriculture. He believed that this power was necessary, and he thought that the House would agree, when he told them that in one year they had 80 cows brought in with indurated udders, a very dangerous form of tuberculosis infection.

Mr. BUXTON thought that the Minister was quite right to lay emphasis on the question of tuberculous cattle. It was only logical now that they were beginning to deal effectively with tubercular milk that the efforts of local authorities and the Ministry should be supported in regard to the control of importation. But he hoped that the efforts would be completely and solely aimed at the protection of public health. Nothing was more important than a clean milk supply, and he hoped that the Bill would help in that direction.

Mr. A. V. ALEXANDER said that local authorities in all the industrial areas were urging either that the Government should alter the amending Act of 1922 and make it compulsory on the Minister to admit cows, or that the Minister should take steps to make an order under that Act so that they could make up the loss to herds caused by slaughtering through the importation of healthy cattle from Canada.

Mr. GUINNESS said that though it was proposed to take powers to deal with tuberculous animals at the ports it was not intended to make any amendment of the Act of 1922 as that would be quite outside the scope of this Bill.

Mr. ALEXANDER said that it was true that the Minister had said that he desired these powers in order to deal with tuberculous cattle, but he would be aware that great dissatisfaction had been felt in connexion with the administration of the 1922 Act.

The Bill was read a second time.

NIGHT WORK IN COAL MINES.

On Wednesday, March 16th, Mr. TINKER asked leave to introduce a Bill to prohibit the employment of young persons at night below ground in coal mines. Leave was given to bring in the Bill which was read a first time.

MENTAL DEFICIENCY BILLS.

On Thursday, March 17th Mr. RHYS DAVIES introduced the Mental Deficiency (No. 2) Bill, a measure to extend the law relating to feeble-minded and other mentally defective persons and to reconstitute the Board of Control. The Bill was read a first time.

On the 18th Mr. CROMPTON WOOD moved the second reading of the Mental Deficiency Bill. He said that the Mental Deficiency Act of 1913, which was one of the most valuable social Acts ever passed, had one defect, namely, that only those who were mentally deficient from birth or from an early age came within its scope. Those words "from birth" and "from an early age," as generally defined by magistrates and by medical practitioners, whether rightly or wrongly, excluded from the benefits of the Act several important classes of people who, he was sure, were never intended to be excluded when the Act was passed. There were those, for instance, who suffered from encephalitis lethargica, meningitis, and frequent epileptic fits. All those diseases might attack a person, not at an early age only, but right through life. Yet under these diseases people were often rendered mentally deficient. Then there was another class which suffered accidents causing damage to the brain. There were frequent cases where the early history of a man was lost. In such cases it was impossible under the present law to deal with people who required treatment, and who ought not to be allowed to go about committing outrages on the community at large. The Bill of last Session was intended to remedy this defect, but it was crowded out at the end of the Session, and there was a good deal of criticism raised on the ground that it might interfere with the liberty of the subject. The present Bill had been drawn to obviate any such charge. The Bill had been drafted with the advice of the experts of the Ministry of Health and the experts of the Board of Control with the invaluable assistance of their president, Sir Frederick Willis, and also with the help of the Association of Mental Welfare, whose president, Sir Leslie Scott, had given a great deal of attention to this subject. Last Session's Bill limited the period within which mental

deficiency must have made its appearance to the ages at which mental development was going on. But it had been felt that this was rather dangerous. Doctors said that mental development could only go on to, at the most, 25 years of age; but the opinion of doctors might vary, and he thought that it was quite rightly contended that this might interfere with the liberty of the subject. In the present Bill, therefore, an age limit was fixed of 18 years. The House might ask why 18 years had been selected? The question had been debated among scientists and in the end, though many people wished the age to be higher, it was decided that to avoid opposition to the Bill they had better put the age as low as possible. At present the two alternative methods of dealing with mentally deficient children who left the special schools was either to shut them up in institutions or let them go into the world, and it had been thought desirable to provide in this Bill foranother method—namely, that they should be placed under supervision. He looked upon this effort to provide supervision for mental deficients under guardianship as one of the hopeful ways of dealing with this problem. Clause 5 of the Bill dealt with defectives who were out under licence in connexion with the continuation of orders. The object was to prevent the defective having to leave his work and return to his centre in order to be re-certified. This provision would empower a doctor at the place where the boy was working to give the certificate necessary for the continuation order. No boy would be certified by one medical practitioner alone. After the medical practitioner sent in his report the case had to be investigated by visitors, who consisted of three Justices of the Peace, with one or more women added, and also a medical practitioner; and their report went up to the Board of Control. Even then the Board could only re-certify the case when it was satisfied that the continuation order was in the interests of the patient himself. Clause 6 made it the duty of local authorities to provide suitable training or occupations for defectives who were at their own homes under supervision. This was important because idleness might lead the children into trouble. Clause 7 enabled local authorities to take cases under contract from other local authorities whose own institutions might be too small. Small institutions did not admit of proper classification and treatment and their multiplication was undesirable. In conclusion the hon. Member described visits he had made to the Manor Institution and the West Park Mental Hospital at Epsom. The first which was for mental deficients had, he said, a large mass of young people all as busy as bees. Workshops were all over the place and the patients were working at different trades. It looked like an ordinary public school with playgrounds, cricket grounds, and football grounds. The West Park Mental Hospital, on the other hand, was controlled under the Lunacy Act. It was the most improved institution of its kind, but among the patients were a lot of cases of encephalitis lethargica which could not be dealt with under the Mental Deficiency Act, 1913. These young sufferers were among elderly people and they had no great provision made for their training. The House would agree that it was not good for young people to be put among middle-aged people in a mental hospital who would probably teach them all sorts of moral perversions. It was the power to put such children into mental deficiency homes that was sought under this Bill.

Sir DOUGLAS NEWTON, in seconding the motion for the second reading of the Bill, said the Medical Committee of the Central Association for Mental Welfare, an organisation which represented all the chief workers associated with this branch of medical science, was anxious that the definition of a defective should be extended in the way suggested in this Bill in the light of the experience gained by the working of the 1913 Act. Experience had shown that defectives had frequently been unable to receive the treatment which they ought to receive. The Bill was not intended to deal with later ages, or with lunatics, as such, or with cases of mental disorder which supervened after maturity had been reached. No doubt there would be some defectives even under this extended provision which would not be covered, but they thought that there would not be a sufficient number to justify a further extension than that provided in the Bill. If there were any further cases it would be wiser, at any rate in the first place, to proceed somewhat slowly and leave such cases to be dealt with under the Lunacy Act. The position of members of the medical profession was by no means satisfactory. That was one of the principal reasons why the Bill had been brought forward. In many cases medical men had found themselves unable to take the responsibility of certifying cases which were not congenital. The medical profession in the administration of the Act of 1913 had shown, it would be agreed, a great deal of courage in dealing with what was admittedly a difficult situation, for they were inadequately protected under the existing law. By raising the age to 18 much would be done to safeguard their position and to bring about a better state of affairs. In the annual report of the Board of Control reference was made to the position of local authorities under the Act of 1913. Under that Act 124 local authorities—county councils and county borough councils—were charged with the duty of administration which entailed reporting upon the incidence of mental deficiency in their areas, and in notifying cases in need of guardianship and control. If the defective was merely in need of supervision—and there were many such cases—the local authority had now no power of notifying the case. The Bill made an important and valuable extension of their power in this respect. In 1924 it was ascertained that there were 48,778 mental deficients in the country, or 1·29 per 1000 of the population. In 1925 there were 55,480, or 1·46 per 1000 of the population. Ascertainment unfortunately tended to increase the figures, but there were great variations in different areas. Oxford headed the list with 4·49 per 1000, but in Swansea the ascertainment only admitted to 0·12 mental defectives in that area. It seemed not unreasonable to suggest that Swansea should take note of her responsibility under the 1913 Act. The necessary funds were at present raised on a basis of 50–50—that was 50 per cent. from the taxpayer and 50 per cent. from the ratepayer. This allocation would in future have to be reconsidered and more help would have to be given by the State to local authorities. It had been suggested that with a view to preventing the growth of future generations of mental defectives preventive measures might be taken and that sterilisation would prove a cheap alternative to segregation. He did not think that argument was a sound one. Mental defectives nearly always required care and protection and sterilisation would not get over that difficulty. Also they nearly always led useless and probably harmful lives and what was more they would be in a position to spread disease. Little expense would be saved to the community. Sterilisation could not be resorted to without compulsion and that would be quite rightly objected to. He had been given figures showing that sterilisation would only result in from 3 to 5 per cent. of the people now in institutions being allowed a greater measure of freedom; therefore he contended that it was not a practical solution, or one which the House, at any rate at the present time, need seriously consider. It had been estimated that there were 160,000 mental defectives and it had been advanced that if they ascertained that there were more, the existing accommodation would prove inadequate. He did not see why any class should be ineligible for treatment, and he urged the need for local education authorities taking action so that all cases which ought to be notified were notified before they reached the procreative age.

Colonel WEDGWOOD, in moving the rejection of the Bill, said if they could divorce mental defective legislation from this detestable coercion, from forcing parent and child to be separated against their wish, nearly all his objections would go; but they would insist not on taking defectives whose parents wanted them to go to homes, but those whose parents did not want them to go. To give experts the right to break up a family against the wishes of the parents was utterly unnecessary. To do that under the guise of charity and benevolence seemed to him utterly damnable. It was true that Sir D. Newton did not approve of sterilisation, but his argument appeared to be that if they could not compulsorily sterilise these people they could at any rate, lock them up. There were other ways of preventing undesirables from breeding besides surgical operations. They could lock people up, and that was just as bad, but rather more hypocritical. The argument for sterilisation was based on the idea that persons who were called morally defective were sure to have mentally or morally defective children. Statistics proved nothing of the sort. The border-line of eccentricity might go either towards genius or towards insanity. If they took into their hands presumptuously the business of nature and of Providence they would take a responsibility which was impertinent even in the twentieth century, and one which was likely to lead the world in directions other than those intended by eugenist societies. The definitions in this Bill, as in the old Act, were to be read by experts who, after all, were very often only expert in the imagination of others. His reading of history filled him with horror at the thought of priestly authority. Let them take care lest they built up in this generation by this worship and prostration before experts a new terror as horrible as the priestly system of old.

Mr. RHYS DAVIES (who was Under Secretary for Home Affairs in the Labour Government) supported the Bill. He said that all who were interested closely in mental deficiency and listened to evidence and inquired into facts were compelled, whatever their views might have been beforehand, to come to the conclusion that something on these lines ought to be enacted by Parliament. He did not agree with every word in the measure which he hoped would be amended in Committee.

Mr. NEVILLE CHAMBERLAIN, Minister of Health, said that the failure of the Bill of last session to reach the Statute Book had created something like consternation in the minds of a very large number of people who had taken a great deal of interest in the efforts made from time to time to improve the conditions of mental defectives and to give the public such protection as was due to them. He had received a great number of letters from Mental Deficiency Committees and other organisations interested in mental welfare expressing deep regret that the former Bill had to be dropped, and urging the Government to reintroduce it at the earliest opportunity. Mr. CROMPTON had undertaken the task of reintroducing the Bill with certain modifications. The new definition in the Bill of last year sought to bring in cases affected by such a disease as encephalitis lethargica. He was inclined to think that the definition in the present Bill was too narrow; these cases might come on at a later stage than 18, and certainly beyond the age of 20. He preferred the original definition, but he would not press the extreme view if there were opposition, or if there was any danger of losing this Bill whose provisions were valuable as a whole. In this matter they had to consider the rest of the community and that was where he thought that Colonel Wedgwood had taken a one-sided view. The Board of Control were always pressing local authorities to provide more accommodation for these unhappy cases and, on the whole, it was not backwardness of opinion that prevented them from doing so but the financial stringency of the present time. He (Mr. CHAMBERLAIN) had from time to time indicated his own view that if certain other institutions now administered by boards of guardians could be handed over to the councils of counties and county boroughs there might be found some temporary alleviation of the situation. He hoped that before long it might be possible to consider something of that kind. Meanwhile let them have certified all those who ought to be certified, in order that even if there was no room for all of them they might be able to judge which were in the greatest need. He hoped the Bill would receive a second reading without a division. When it reached the Committee he had no doubt Mr. WOOD would be ready to consider any suggestion for its improvement by way of amendment.

After further discussion,

Dr. VERNON DAVIES said there was a definite distinction between a mentally defective and a case of mental disorder or lunacy. Mental defectives suffered from what might be scientifically called amentia, while cases of mental disorder suffered from dementia. The unfortunate thing was that in the case of amentia they could not expect a cure. But while they could not cure mental defectives they could improve them. Under the provisions of this Bill the interests of the mental defective were safeguarded at every point. In cases of encephalitis, in which they got arrested or incomplete development—the disease perhaps occurring in a brilliant child—something possibly happened to the cells of the brain which prevented their development. It was accepted now by most people who were competent to judge that these cases only occurred in adolescence. The Bill was a marked improvement, a definite step in advance. He had to make again a protest which he had frequently had to make in that House, that medical men were criticised by members of the Labour Party in perhaps not too kindly a manner. They had to bear in mind that experts had a certain amount of knowledge and presumably a greater amount than their critics. However wrong experts might be they ought to give them the credit of doing the best to the extent of their knowledge. Medical men, by reason of their training, possessed knowledge which was superior to that of the layman. It was only fair that a certain amount of attention should be paid to them. It was not the wish of medical men to incarcerate anybody who had queer ideas or whims, otherwise there might be a lot of people in danger. This Bill was not only supported by the Board of Control, the Ministry of Health, and medical men as a whole, it had also the support of every organisation which was concerned with these cases.

Lieut.-Colonel FREMANTLE said he was strongly in sympathy with those who had spoken on the question of the liberty of the individual. Colonel WEDGWOOD had touched on one of the most difficult points which medical men had to decide, and that was the question of where it became essential to interfere with the liberty of a child either for its own sake or for the sake of the community. Medical men were the last to say at any moment that they were right in any decision, or that they could lay down a hard-and-fast law. Medical men were empirics; in the last resort they must be. But he suggested to Colonel WEDGWOOD that he had carried his argument quite far enough. There was in the first place, the fact that mental defectives could be shielded and could at the same time enjoy great liberty. Those who had expressed the fear that individuals were retained in these homes against their will should be glad to know that experience frequently showed that the reverse was the case. It had been suggested that they should have an intermediate institution where a patient could be kept for five days of the week and allowed to go home at week-ends. That system already existed in a number of institutions. It was clear that there were 55,000 mentally defectives, a number which might be enlarged with a higher standard, or as some people would say, a lower standard of definition. There was accommodation for only 5000 in mental institutions. On the other hand, a very large number of institutions under boards of guardians were being set free by the legislative measures of recent times, like the Widows' and Orphans' Pensions Act, and so on. This Bill gave importance to the need of putting under one local authority the Poor-law and other institutions in order that the greatest use might be made of the existing accommodation. In the interests of the mental defectives themselves, of their families, and of the public, he hoped that this Bill would be passed into law.

The Bill was read a second time and committed to a Standing Committee.

MIDWIVES AND MATERNITY HOMES (SCOTLAND) BILL.

On March 18th Mr. BARCLAY-HARVEY moved the second reading of the Midwives and Maternity Homes (Scotland) Bill. He said that the object of the measure was to reduce maternity and infant mortality in Scotland. Firstly, the Bill provided for the registration of midwives so as to reduce the number of unqualified persons; secondly, the measure provided for the registration and inspection of maternity homes. As regarded the question of midwives the position at present was regulated by the Act of 1915. In that year two Acts were passed, one being the Notification of Births Act, which enabled authorities in Scotland to make arrangements for expectant and nursing mothers; the other was the Midwives Act, which required midwives to be registered and supervised by local authorities under the supervision of the Central Midwives Board. These two Acts had reduced the infant death-rate, but unfortunately the rate of maternity mortality had not been reduced. This was so unsatisfactory that a committee was appointed to inquire into the question, presided over by Lord Salvesen. Some of the figures which they had given in their report were extremely interesting. The committee took the decennial period from 1855. From 1855 to 1864 the average death-rate per 1000 births was 4·9. From 1915 to 1922 the rate had increased to 6·2. While the two sets of figures were not quite comparable, because the first were based on less accurate information than the last, they showed at any rate that this terrible evil was not decreasing in Scotland, but was acutally increasing. Lord Salvesen's committee made the definite statement that the evidence they received was unanimous on the essential point of this Bill. The committee made a variety of recommendations and two of them definitely called for legislation on lines of this measure. In addition the proposed authority was recommended by the Central Midwives Board in 1925 and 1926. The birth rate in Scotland was rather over 100,000 per annum and therefore the maternity death rate was 600 women a year. The desire was to eliminate, if possible, the unqualified midwife. Difficulty had been experienced in administering the Act of 1915 because of the expression "habitually, and for gain," and the first intention of this Bill was to get over that difficulty and try to tighten up the position. Words had been put in which would leave sufficient elasticity to prevent hardship in cases where it was not possible to get a qualified midwife. Clause 3 was important, because it entitled a midwife who had been suspended on account of the possibility of her carrying infection through no fault of her own, to be paid during the time she was actually standing off. Part II., in brief, simply insisted that maternity homes should be registered and laid down a penalty for anyone who failed to register and yet carried on such a home.

Sir GEORGE BERRY seconded the motion for the second reading of the Bill. He said that Part I. was a matter of public health, and Part II. was really a matter more of public propriety. He could assure the House, having made careful inquiry, that the medical profession in Scotland approved entirely of the Bill. Part I. had been carefully considered by the Central Midwives Board and it also came before the Consultative Committee of the Board of Health. In the final draft of the measure all objections had been met. The question of maternity homes was a matter of social reform and he thought it must commend itself to every member of the House. The general opinion of Scottish medical graduates was that the reform proposed was wholly desirable and necessary.

Major ELLIOT, Under Secretary of State for Scotland, said that the Bill was backed by members of all parties, and he suggested that it should be given a second reading. Any points of detail could be discussed in Committee.

The Bill was read a second time and committed to a Standing Committee.

HOUSE OF COMMONS.

WEDNESDAY, MARCH 16TH.

Dangerous Drugs.

Mr. NEIL MACLEAN asked the Secretary of State for Foreign Affairs whether he was aware that the printing of document O.C. 294 (b) of the League of Nations, dealing with the traffic in dangerous drugs, had been stopped and all existing stocks returned to Geneva; and who issued the orders and what were the reasons.—Sir A. CHAMBERLAIN replied: I have no official information on this subject, but I understand that the publication of this document is merely temporarily postponed pending revision.

Poor-law Expenditure in West Ham.

Replying to Mr. WILLIAM THORNE, Sir KINGSLEY WOOD (Parliamentary Secretary to the Ministry of Health) stated that the Budget statement of the guardians of the West Ham Union for the half year ending Sept. 30th, 1927 showed a total of common charges amounting to £759,892. This sum included £76,000 for lunatics; £1000 for vaccination fees; £7000 for maintenance in hospitals, &c.; £6000 for drugs and medical appliances; and £370 for subscriptions to hospitals. The income statement showed £709,078 accounted for by precepts, and £50,000 moiety of grants to be received from county councils of West Ham, East Ham, East Ham and Essex under the Local Government Act, 1888, and other receipts.

Approved Societies and Dental Benefit.

Mr. RHYS DAVIES asked the Minister of Health what tribunal would determine any differences which might arise between a dentist and a regional dental officer; and under what authority would any decision be given by such tribunal.—Mr. CHAMBERLAIN replied: The function of a Regional Dental Officer is to furnish an independent professional opinion for the guidance of approved societies and dentists in connexion with claims for dental benfit. If a dentist is dissatisfied with any action which a society, after consideration of the report of the Regional Dental Officer, may take, or propose to take, he may refer the case to the Dental Benefit Joint Committee whose jurisdiction both societies and dentists have, under the new arrangements, agreed to accept.

THURSDAY, MARCH 17TH.

Maximum Disablement Pensions.

Mr. BECKETT asked the Minister of Pensions the number of men drawing 100 per cent. disablement pensions in January, 1925, and January, 1927, or the nearest available dates.—Major TRYON replied: The number of men drawing pension at the maximum rate of 100 per cent. was in January, 1925, approximately 32,000. The number of the same class in January, 1927, was approximately 34,000.

Open-air and Hospital Schools.

Mr. SHORT asked the President of the Board of Education what was the number of open-air schools under the county and local educational authorities of Staffordshire; and the number of children in attendance.—The Duchess of ATHOLL (Parliamentary Secretary to the Board of Education) replied: There are at present two open-air schools in Staffordshire, and two hospital schools conducted on open-air lines. The total number of children on the registers of the four schools, on March, 31st, 1926, was 158. The hon. Member will, however, understand that the total number of children dealt with in institutions of this type during the year is very considerably larger than the number in attendance on any given date.

Repair of Insanitary Houses.

Mr. ROBINSON asked the Minister of Health if his department took any action in compelling, or had authority to compel, local authorities to reinstate insanitary houses at the expense of the owners of such property which was a menace to the general health of the public and the tenants in particular.—Mr. CHAMBERLAIN replied: Part I. of the Housing Act, 1925, contains the provisions enabling local authorities to secure the repair, maintenance, and sanitary condition of houses at the expense of owners, and provision is also made for their enforcement by order of the Minister of Health if, after receiving a complaint and holding a local inquiry, he is satisfied that there has been default on the part of a local authority.

Children and Vaccination.

Dr. WATTS asked the Minister of Health the number of children who attained the age of 12 months during the year 1926; the number of those in respect of whom the parents furnished a certificate of successful vaccination or a certificate of conscientious objection; the number of those whose parents did neither; and the number of prosecutions.—Mr. CHAMBERLAIN replied: Accurate information is not available as to the number of children who attained the age of 12 months during 1926. The total number of births registered in England and Wales during 1925 was 710,582, but the vaccination returns in regard to the children born in that year are not yet quite complete. The returns at present to hand relate to a total of 708,500 children and of these 37,728 died unvaccinated. Certificates of successful vaccination were furnished in respect of 313,450 children, and declarations of conscientious objection to vaccination in respect of 291,347 children. As regards the remaining 60,975 children no such certificates or declarations were furnished. I have no information as to the number of prosecutions.

Unhealthy Schools.

Mr. SHORT asked the President of the Board of Education the number of existing elementary schools condemned as unsuitable and incapable of improvement; and the number of children attending such schools.

Mr. BARKER asked the President of the Board of Education whether he was aware that there were schools housing more than 500,000 children which were totally unfit for the purpose and should be closed forthwith; and what steps were taken to see that these schools were replaced by buildings of a more healthy type.—The Duchess of ATHOLL replied: The number of schools on list A—that is schools which have been reported as unsuitable and incapable of improvement—is now 623. The number of children on the registers of these schools is about 160,000 and not, as suggested by Mr. BARKER, more than 500,000. The latter figure is an estimate of the total number of children attending the schools originally included in the lists A and B. In a number of cases the requisite action has already been taken, and proposals have been received for dealing with a large number of other schools on the lists. The programmes which have been submitted indicate that authorities contemplate being able to deal with the bulk of the provided schools on the lists by the end of the programme period, and my right hon. friend is now considering what further steps should be taken to secure that the whole problem, both as regards provided and non-provided schools, is treated on a systematic basis.

Wines from Bond for Medicinal Purposes.

Major BRAITHWAITE asked the Chancellor of the Exchequer whether he would consider, in view of the serious epidemic of influenza, releasing from bond the requirements of responsible druggists of sherry used for medicinal purposes.—Mr. CHURCHILL replied: I am informed that special consideration is given by the Commissioners of Customs and Excise to applications for the delivery of wine to be used in the manufacture of medicated wines.

FRIDAY, MARCH 18TH.

Rejection of Naval Recruits.

Mr. HORE-BELISHA asked the First Lord of the Admiralty how many men presented themselves on an average each month for recruitment in His Majesty's Navy; and how many were rejected, and for what principal reasons.—Lieut.-Colonel HEADLAM replied: During 1926 the average number of candidates who presented themselves each month for entry was 5100, and the average monthly number rejected was 4460. The main causes of rejection were defective vision, teeth and hearing, and being under educational standard.

Rejection of Recruits for the Royal Air Force.

Mr. HORE-BELISHA asked the Secretary of State for Air how many men present themselves on an average each month for recruitment in His Majesty's Air Force; and how many were rejected, and for what principal reasons.—Sir S. HOARE replied: The total number of men who presented themselves for recruitment in the calendar year 1926 was 1028. Of these, 258 were rejected on medical grounds and 391 on other grounds such as educational unfitness or age. The principal causes of rejectment on medical grounds were dental defects, deformity of feet, heart disease, poor physique, respiratory diseases, defective vision and ear diseases.

MONDAY, MARCH 21ST.

Opium Shops in India.

Mr. GARDNER asked the Under Secretary of State for India the number of licensed opium shops in India; the area of opium cultivated; and the parts of India in which opium-smoking was prohibited.—Earl WINTERTON replied: The number of shops in British India in 1925–26 was 5844 with the addition of a small number in Delhi, Ajmer-Merwara, Coorg and Baluchistan which in 1924–25 was 88. The latest figure of poppy cultivation in British India shows 114,198 acres in the year ending Oct., 1925; in addition there was a small area of 1653 acres in the Punjab Hills. The law in British India prohibits the sale of opium prepared for smoking, and also its manufacture except by an individual

for his own use from opium lawfully in his possession. Opium smoking in company is illegal in the United Provinces, Punjab, and North-West Frontier Province, and consumption of opium in any form is subject in Burma and Assam to registration and individual rationing.

Poor-law Medical Relief.

Mr. FREDERICK ROBERTS asked the Minister of Health whether he was aware that the majority Report of the Royal Commission referred to the unsatisfactory condition, as to medical relief, of some of the districts where the only method of obtaining an order for the doctor was from the relieving officer, and that officials of his department stated in their evidence before the commission that if the overseers were abolished it would be necessary in the country districts to give their relief powers to some local officer or to the parish guardian; and whether, in the light of these facts, he would have the draft Order in Council reconsidered.—Sir KINGSLEY WOOD replied: Such evidence as was given by officers of the Department was to the effect that no practical hardship would result from the abolition of the Overseers; one Inspector suggested that the power of the Overseers might be given to the local Guardians. The Order in Council has been made after lying on the Table for the prescribed period, and my right hon. friend does not think it is necessary to reconsider the matter.

Pensions Hospital Patients and Vaccination.

Mr. ROBERT MORRISON asked the Minister of Pensions whether he was aware that instructions were issued on the 9th instant to the patients of the Ministry of Pensions Hospital, Chepstow, that all patients must either be vaccinated or take their discharge; and by whose authority and for what reason these instructions were issued.—Lt.-Colonel STANLEY (Parliamentary Secretary to the Ministry of Pensions) replied: The instructions given were not in the terms suggested by the hon. Member. In consequence of the recent severe outbreak of small-pox in Monmouthshire, it was deemed necessary by my medical advisers to take all possible steps both to protect the patients in the hospital at Chepstow and to obviate the risk of the closure of this important institution which serves the needs of pensioners in Monmouthshire and South Wales, as closure would have been the only possible course in the event of an outbreak of this disease occurring in the hospital. With this view, instructions were issued to the Medical Superintendent directing his attention to the importance of the matter and advising him that, in the case of any patient whom he considered not already adequately protected against the disease, revaccination should be secured as far as possible, if he considered it necessary and medically practicable. In the event of refusal on the part of a patient or where the case was not, on medical grounds, suitable for vaccination, the case was to be dealt with either by the temporary provision of alternative treatment, or by isolation, or by other means, compatible with the welfare of the patient, which would obviate contact with other patients in the institution. These instructions have been carried out with careful regard to the well-being of all the patients concerned, for whose care my right hon. friend is responsible, and, I am glad to say, have so far been effective.

Infant Mortality in Tropical Colonies.

Mr. HERBERT WILLIAMS asked the Secretary of State for the Colonies whether systematic work was being undertaken in the tropical colonies for the purpose of reducing the heavy infantile mortality.—Mr. AMERY replied: Yes, Sir, measures are being taken in most tropical colonies on the lines that have been successful in reducing infant mortality in this country, and in many of them the results compare not unfavourably with what has been accomplished here. The governments of tropical colonies are fully alive to the importance of this matter. Infant welfare clinics have been established and women doctors, nurses, and health visitors, who have had special experience in this branch of medical work, are being appointed in increasing numbers.

Gland Grafting in Animals.

Sir HARRY BRITTAIN asked the Minister of Agriculture whether he had had brought to his notice any of the experiments of Dr. Voronoff in grafting an extra gland on to livestock for the purpose of producing a finer and more vigorous type; and, if so, whether these experiments can be looked upon as successful and would receive attention from his department.—Mr. GUINNESS replied: I am aware of Dr. Voronoff's work on gland grafting, and I have arranged with Dr. Voronoff's concurrence, for a small commission of scientific men to examine and report upon the experimental work on sheep which has been carried out at the Government breeding station in Algeria. Owing to the bad season, the visit of the commission has been postponed until October or November, when the grafted sheep will be available for examination.

Registration of Opticians.

Mr. HERBERT WILLIAMS asked the Minister of Health the composition of the departmental committee on the registration of opticians.—Sir KINGSLEY WOOD replied: The personnel of the committee is not yet complete, but my right hon. friend hopes to be in a position to announce its composition at an early date.

TUESDAY, MARCH 22ND.

Casual Vagrants and the Spread of Scabies.

Mr. CRAWFURD asked the Minister of Health whether he was aware that, at a recent meeting of the National Association of Vagrancy Committees, complaint was made that casual vagrants suffering from scabies were passed on from casual ward to casual ward, thereby spreading the disease; and whether he proposed to take any steps in the matter.—Sir KINGSLEY WOOD replied: This complaint has not previously been brought to my right. hon. friend's notice, but he will make inquiries. I may say that the attention of guardians has from time to time been drawn to this matter by circular and otherwise. The regulations applicable to casual wards contain provisions enabling guardians to detect and deal with such cases, and the guardians also have powers of detention.

Poor-law Medical Relief.

Sir CHARLES OMAN asked the Minister of Health whether he was aware of the recommendation of the Royal Commission on Poor-laws to the effect that medical relief should be made more readily accessible and of the evidence of a witness speaking on behalf of the British Medical Association (Report, pp. 282-4), to the effect that if doctors attended without an order the rule was that they did not get paid; and whether he could take steps to ensure that, in the case of medical assistance being rendered to any poor person on account of accident or sudden illness, payment should be made to the medical man, although no order for relief might have been given by the guardians or the relieving officer.—Mr. CHAMBERLAIN replied: The reply to the first part of the question is in the affirmative, but I am not aware that at the present time any difficulty of the kind suggested in the second part has arisen. I should be glad to consider any information my hon. friend may have on the subject.

DONATIONS AND BEQUESTS.—Dr. Samuel Clarke Noble, M.R.C.S., Kendal, Westmorland, said to be the oldest medical practitioner in the North of England, who died at the age of 89 years, bequeathed £3000 to the master and scholars of Balliol College, Oxford, for the foundation of an open classical scholarship to be known as the "Eric Raymond Noble Scholarship," £300 to the Medical Mission of the Church Missionary Society, £1150 to Dr. Barnardo's Homes for the erection of a cottage at the Girls Village Homes, £1500 to the Westmorland County Hospital for the endowment of three beds in the children's ward in memory of Hugh Percy Noble, Kathleen Maude Noble, and Eric Raymond Noble. The ultimate residue of the property—originally £38,807—as to one-third to Middlesex Hospital for a scholarship in remembrance of his son, formerly anæsthetist at the hospital, to be known as the Eric Raymond Noble Scholarship; one-third to Balliol College for a classical scholarship, and one-third to Dr. Barnardo's Homes for general purposes.—Miss Margaret Jane Brown, Glororum, near Morpeth, Northumberland, besides other bequests left £500 each to the Victoria Blind Asylum, Newcastle, and the Newcastle Infirmary.—Mr. John Cowan, who for over 50 years was the agent of the Free Church of Scotland and the United Free Church, left £201,766. Besides bequests to these institutions he left £1000 each to Longmore Hospital for Incurables, Edinburgh, and the Sick Children's Hospital, Edinburgh; £500 to the Blind Asylum, Edinburgh; and, after a life rent, £40,000 to the Edinburgh Royal Infirmary, to endow a ward in memory of his father, Lord Cowan. The residue is to be divided between the United Free Church, for the Aged and Infirm Ministers Fund, and the Royal Infirmary, to equip, if thought practical, a ward or hospital for paying patients.—Among other donations the late Mr. Howard Ellis, of Swallowhurst, Blackburn Park, Didsbury, Manchester, left £1000 each to the Royal Free Hospital, London, and the Middlesex Hospital, £500 each to the London Hospital, the University College Hospital, London, the Manchester Royal Infirmary, the Ancoats Hospital, Manchester, and St. Mary's Hospital for Women, Manchester.—Miss Catherine Mary Stewart, Winchcombe, Gloucester, formerly of Manchester, besides other bequests, left £1000 to the Winchcombe Hospital for the endowment of two beds.—The Chelsea Hospital for Women has received a bequest of £1000 from the late Sir Squire Bancroft to endow a bed in memory of the late Lady Bancroft.

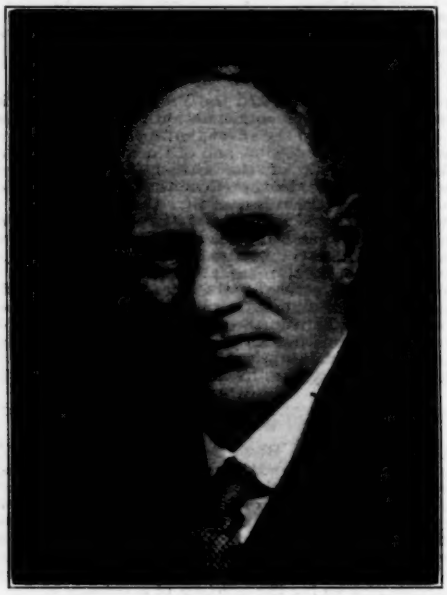
Obituary.

JOHN BROWNLEE, M.D., D.Sc. GLASG., D.P.H.,

DIRECTOR OF STATISTICS, MEDICAL RESEARCH COUNCIL.

THE death from broncho-pneumonia, after little more than 48 hours' illness, of Dr. John Brownlee, which occurred on March 20th, will come as a great shock to his numerous friends. He had not enjoyed robust health for some years, but he was actively engaged in research work only a few days ago and apparently in his usual health and spirits.

John Brownlee was born in 1868, a son of the Manse, and educated in the University of Glasgow where he had a brilliant career, securing first class honours in mathematics and natural philosophy in his Arts course and commendation both for M.B. and M.D.



JOHN BROWNLEE.

degrees. He graduated M.A. in 1889, M.B. in 1897, M.D. in 1898, and D.Sc. in 1907. He was also a D.P.H. of Cambridge, and some years ago the Faculty of Physicians and Surgeons of Glasgow conferred upon him the distinction of election to the Fellowship without examination. After graduation and the usual resident posts, Brownlee spent two years as resident physician in the Belvidere and Kennedy-street Fever Hospitals and then nine months as pupil assistant to the late Dr. J. B. Russell in the Glasgow Health Office. This experience impressed him deeply, and Russell was for him one of those great men who, in Helmholtz's words, alter one's whole scale of values. In 1899 Brownlee was appointed medical officer of health of Guernsey, and although he held the post only 18 months this stay in an environment very different from that of a great industrial city also affected him deeply. In 1900 he returned to Glasgow as physician-superintendent of the Belvidere Fever Hospital and for the next 14 years (he transferred from the Belvidere to the Ruchill Hospital in 1908) he was mainly engaged in the clinical and administrative work of a large hospital for infectious diseases. In this work he was conspicuously successful. Although not a fluent lecturer he was an inspiring clinical teacher, and his old pupils remember gratefully their lessons learned at Ruchill. Brownlee found time, however, to apply his mathematical ability to medical and biological problems, and before his appointment by the Medical Research Council, in 1914, to be the first director of their statistical department, he had already published several important papers of a biometric character and won a reputation as a prominent exponent of the statistical method. From 1914 onwards Brownlee's professional interests were statistical and a bibliography of his work since 1913 includes no less than 45 titles. Many of these papers, such as his memoir on the epidemiology of phthisis and his investigation of the periodicity of epidemics of measles, involved an immense amount of detailed analysis and are of permanent scientific value. To the public he was best known for his enunciation of 33 weeks as the interval between epidemics of influenza and for his forecast based upon this assumption.

"It is not possible," writes one of his colleagues, "within a few hours of the loss of a great investigator adequately to characterise the nature and value of his contribution to knowledge. Perhaps it may be said that the real value of Brownlee's life-work was not so much in any important specific addition to knowledge as in the general character, the *quality* of his work. This may, at first, seem a hard saying, for in the mere A B C of literary composition Brownlee was deficient. His literary style was not very attractive and he had none of the power, so conspicuous in, for instance, the writings of Mr. Udny Yule, of expressing a difficult mathematical argument in such a way that no attentive reader can fail to grasp it.

"But any reader who cares to surmount the superficial difficulties of Brownlee's style is inevitably conscious of a certain philosophical breadth of treatment which he will seek in vain in the writing of most statistical epidemiologists. The memoir on the epidemiology of phthisis or the report on the mortalities of birth, infancy and childhood, well illustrate this quality. A reader may dissent from every particular proposition and yet feel that the author has placed him under a great obligation, has obliged him to look at the problems from a loftier standpoint. There is a great gulf between acuteness and sagacity. Of that acuteness which enables a man to solve neatly particular problems—the mental analogue of the precision with which a terrier nips rats—Brownlee had little; he was not acute in the narrow sense but he was something more, he was sagacious. Of course, he had the defects of his qualities. People who did not know him intimately and sought guidance on some specific problem might be, and frequently were, exasperated by the way he would pass from topic to topic and leave the difficulty just where it was at first. But nobody who knew him intimately could fail to be struck by the immense range of his erudition or to be charmed by the simplicity of his character."

Brownlee was singularly free from personal jealousy or vulgar ambition and if he was not, in the formal sense, a great teacher of statistical epidemiology, his writings and example have done, and will continue to do, great good. Many years ago, Dr. Campbell Munro wrote: "Dr. Brownlee is a man of high intellectual endowments, of great breadth of view, of brilliant scientific attainments—a man who is certain to attain a high position in the public health speciality. He is a man of high moral purpose and elevation of character, and, with all his attainments, of singular modesty and simplicity." That might fairly stand for Brownlee's epitaph.

CORRADO DONATO DA FANO, M.D. PAV., F.L.S., F.R.M.S.

Dr. C. D. Da Fano died suddenly at his home in Campden Hill at the age of 47 on March 14th, hardly more than a year after the death of his old teacher Camillo Golgi. Dr. Da Fano was an Italian by birth and education who had lived and worked in this country only since the war, having been appointed as lecturer in histology at King's College,

London, in 1918. He received his medical education at the University of Pavia, becoming M.D. in 1905, and seven years after Libero Docente in morbid anatomy. Golgi's institute of histology and general pathology at this University is famous, and Dr. Da Fano's life work was early directed into neuro-histological channels. After qualifying he obtained a travelling fellowship at Milan, and later worked in Ziehen's Neurological Clinic at Berlin, at the laboratories of the Imperial Cancer Research Fund in London, under the direction of Dr. E. F. Bashford, and at Groningen. He returned to Milan as Vice-Director of the Pathological Institute shortly before the war, during which he served as Captain in the Italian R.A.M.C. When in 1918 he settled in London, holding the appointment of lecturer in histology and later as reader in the University of London, he was already known, not only in Italy, but throughout Europe as a brilliant pupil of Golgi.

Almost immediately after arrival he became, like the rest of the neurological world, engrossed in the problems presented by the then new disease encephalitis lethargica, and he brought to this study remarkable skill in technique and indefatigable patience. His work on this disease was carried on over many years and was indeed still progressing when his sudden death occurred; his last paper on the subject appeared in the *Journal of Pathology and Bacteriology* as recently as last January. Soon after beginning this research he demonstrated "minute bodies" which were found not only in the human form of the disease, but also in the allied herpetic encephalitis of rabbits. But although he drew attention to their constant presence and was inclined to consider that they might represent some phase of the virus of the disease he never claimed this directly. His skill was soon recognised by the Medical Research Council and the Ministry of Health, and he was still engaged in research work for the Council when he died. His contributions to the histo-pathology of encephalitis were characterised by wide knowledge as well as by careful observation. Valuable as this work was, we may owe him a greater debt of gratitude for the labour and care which he devoted to the perfection of neurohistological technique. In this he was a master, but unlike many of the great neurohistologists he worked rather for others than for hir self, standardising every step of a difficult method until the most unskilled laboratory assistant could use it with success. Much of the fruit of this work is found in the sections he contributed to the last editions of "The Microtomist's Vade Mecum." The elaboration of a complex technique is slow and often disappointing work, but Da Fano was prepared to give endless time and trouble in order to achieve fine results. The courses of lectures on the Histology of the Nervous System which he gave for several years at King's College aroused widespread interest. The magnificent preparations by which they were illustrated revealed the minute internal structure of the neuron and the variety of form and activity of the neuroglia as they had never before been shown in this country. In addition to his laboratory work, Dr. Da Fano, who had a wide knowledge of European languages, found time to write abstracts and reviews of foreign work on anatomy, physiology, and pathology. He was a constant contributor to *Medical Science*, and was one of the editors of *Physiological Abstracts*.

The deservedly high position which Da Fano had attained in neuropathology was undoubtedly, writes a colleague, due to infinite patience and unremitting attention to detail in histological technique. These qualities, which are the basis of all good work in the histology of the nervous system, he possessed abundantly, and his description of the histological changes in the brain in encephalitis lethargica and in the experimental herpetic encephalitis of rabbits stands as comprehensive and authoritative. The loss to histology in his death is great and his fellow-workers will long remember his kind helpfulness and unfailing courtesy and modesty.

Da Fano gave freely to his adopted country from a wealth of knowledge and of skill which few possessed in equal measure. We mourn the loss not only of a pioneer worker in medical science, but also of a charming personality.

Dr. Da Fano married in 1915 Dorothea Landaw, who survives him with two children.

THE LATE PROF. F. A. SOUTHAM.—We greatly regret that the illustration published in connexion with the obituary notice last week was not reproduced from a photograph of Prof. Southam. We received the photograph with a categorical description written on the back of it, stating it to be that of "the professor of surgery in the University of Manchester, who died on Thursday, March 9th." It was seen at once that the photograph depicted a younger man, but in view of the endorsement it was assumed that it was a proof of an old photograph.

THE USES AND LIMITATIONS OF ULTRA-VIOLET LIGHT THERAPY.

DISCUSSION AT SECTIONS OF MEDICINE, DERMATOLOGY, AND STUDY OF DISEASES IN CHILDREN OF THE ROYAL SOCIETY OF MEDICINE.

At a combined meeting of these Sections held on March 22nd, with Dr. HUGH THURSFIELD, President of the Section of Medicine, in the chair, a discussion on the Uses and Limitations of Ultra-violet Light Therapy was opened by Dr. S. E. DORE, who drew attention to the introduction of red light treatment for small-pox, and concentrated sun- and arc-light treatment for lupus in 1893 and 1894. He sketched the history of light treatment from that time up the present. Although a great deal had been published recently he doubted whether, from the dermatological aspect, much of value had been added to the work published 26 years ago. The value of ultra-violet light in rickets was demonstrated by Huldschinsky in 1919, and confirmed by English and American observers. Operators commonly noticed a beneficial effect when they were treating patients with radiations, and it seemed possible that ionisation of the air might liberate ozone or some such substance, which was responsible for some of the improvement. Haxthausen's experiments tended to confirm this, as did the fact that treatment of one part of the body often benefited the whole organism. Sonne had suggested that this effect, if not due to a genuine radiation, would be better described as the diffusion of some substances in a vaporous form.

The dermal diseases which might follow constant or excessive exposure to the sun's rays were then mentioned, but Dr. Dore said that the bogey of carcinoma had been laid. Mechanical dangers from ultra-violet administration included breakage of quartz burners, burns from spluttering electrodes and excessive exposure, electric shock, and deleterious effects on the eyes. Other evil results were the debility and depression produced by too frequent or too lengthy applications, and the possibility of lighting up a general tuberculosis or aggravating a febrile disease. He suggested for consideration the problem of whether the inflammatory reaction aimed at in dermatological light therapy were a specific one or not, and if not, whether equally good results could not be obtained by simpler measures such as rubefacients and caustics. He asked whether the benefits obtained in certain cutaneous diseases were due to the indirect or the direct action of light; he thought that the production of sweating might be part of the value of the treatment. An important point for discussion was whether the claims made for ultra-violet light treatment were justified by the results obtained, or whether the results in general conditions were not equally well produced by appropriate diet, drugs and hygiene. He thought it time that something was

said or done to correct some of the exaggerated statements made.

Ultra-violet Light for Children.

Dr. H. M. ODDY pointed out the difference between the action of ultra-violet light on the skin of adults and infants respectively. Although an infant's skin was thinner, an erythema was much harder to produce in it than in that of an adult. The danger of overdose was therefore increased, for children could not describe their symptoms. The signs were increased irritability and restlessness, disturbed sleep, a persistent loss of weight, digestive troubles, and a loss of appetite. Except in tuberculosis, better results were obtained with the mercury-vapour lamp than with the carbon arc. His impression was that the tungsten lamp was not of much use to children except in general baths. Treatment should not be continued too long; 12 to 20 applications should be followed by a month's rest. The action of light on the cholesterol, calcium and phosphorus in the blood was known, and there might be yet other substances on which light acted to produce its therapeutic results. Gastric juice, for instance, had its acidity lessened by light baths. Turning to the clinical uses of light, he remarked that it should be employed in rickets as an adjunct to cod-liver oil. In tuberculous peritonitis and glandular tuberculosis light was counter-indicated by active disease of the lungs, otherwise it might be used in graduated doses. It gave better results in tuberculosis of the bones and joints. Light should never replace other treatment in surgical tuberculosis, but should be used in conjunction with it. In pregnancy and lactation, especially when the milk flow fell off, light was very useful. It acted like a charm in restless cases of malnutrition and marasmus, but might do harm to a very severe case. Older children of the "hypotonic" type benefited much; failures, especially with out-patients, were generally due to overdose or bad regulation. Light therapy was indicated in post-febrile and post-operative debility and depression, muscular paralysis, asthma, late whooping-cough, and anæmia where hæmoglobin was low; but was counter-indicated in leukæmia.

The Physiological Basis of Light Treatment.

Dr. A. EIDINOW dealt with the scientific and biological aspects of light treatment, and related experiments undertaken to show its action on the bactericidal power of the blood. Irradiated skin did not differ from ordinary skin in its bactericidal value, and the penetrative power of the rays was very small, therefore the result could not depend on direct action on the skin or on the blood or blood-cells. The ultra-violet rays were bactericidal, but bacteria in blood or serum when exposed to the rays, cool, were entirely unaffected. The solution of the problem seemed to lie in the proved fact that an erythema dose of light will produce a fixed leucocytosis beneath the skin, and to the activation and absorption of the ergostearol present in skin and sweat glands. It had been shown that this ergostearol was allied with the cholesterol, and that when irradiated it was the potent factor in preventing rickets. The skin rapidly became immune to ultra-violet rays, and remained so for 14 days until the desquamation was over and new skin had developed. There was a definite optimum area for exposure if the maximum bactericidal effect were to be obtained; this was one-sixth of the total surface area. There was no need for large, massive exposures. This point needed clinical investigation and might revolutionise the technique of exposures. Many bad results might be due to the fact that the patient's skin was immune to light, and so he was not getting irradiation at all. The dosage depended much more on the surface area of skin exposed than on the quantity of light. The most important counter-indication was the extent to which the disease had progressed. Very serious results might follow large exposure in cases where the blood was impoverished, as in septicæmia.

Light in Surgical Tuberculosis.

Sir HENRY GAUVAIN pointed out that, although the title of the discussion was "ultra-violet" rays, very little work had been done on the use of pure ultra-violet rays, and in actual treatment no one had cut off the infra-red and visible rays, except for diagnostic purposes, as in ringworm. He was sure that for surgical tuberculosis real sunlight was the best, and in sunlight the ultra-violet rays only constituted 1 per cent. The value of the artificial methods—carbon arc and mercury-vapour lamp—diminished as their ultra-violet ray power increased. Clinical experience did not support the view that the good effects of the treatment are due to the ultra-violet waves. Other radiations must have either some good effect or else the power of intensifying, diluting, or modifying the ultra-violet. The visible rays certainly had much greater penetrative power. In surgical tuberculosis light was not specific and must be regarded merely as an aid—though a very valuable aid—to other forms of treatment. It had been shown that the increase in basal metabolism during exposure to sunlight was not due to the rays but to the cold air. The value of light largely depended on the patient's general reaction, which was made up of many constituents. One was pigmentation, and there was no doubt that the majority of pigmenters did very much better than the majority of non-pigmenters. Healing lesions healed more quickly under light treatment, though progressive lesions did not benefit. The healing of sinuses was hastened, often with very little scarring, and sequestra might be painlessly extruded. He did not entirely agree with Dr. Eidinow that there could be no direct action of light on the bacteria in lupus. The nodules might be more easily permeable by light than ordinary skin. A brisk local dose from the mercury-vapour lamp would produce little blebs wherever there were nodules, when the rest of the skin was not blistered. These blebs might assist in healing.

General Discussion.

Dr. J. H. SEQUEIRA agreed that the visible rays were of value. The general treatment of the body by light had healed lupus without any local measures whatever, but in no case was it wise to rely entirely upon general irradiation of the body. It had been shown that no change was produced in basal metabolism solely by general light baths, nor did these baths prevent the acute specific fevers. In post-febrile debility, however, they were of great value. He had seen very good results with lupus in patients who did not pigment. The hæmobactericidal reaction was a test requiring the utmost delicacy and experience in observation, and was not likely to be of much practical use. The area to be exposed was a problem requiring the most careful investigation. He had been very disappointed with the clinical results in cases treated by the piecemeal methods. Light treatment was of very great value in some chronic eye affections, especially phlyctenular conjunctivitis, corneal ulceration, and some cases of tuberculous irido-cyclitis.

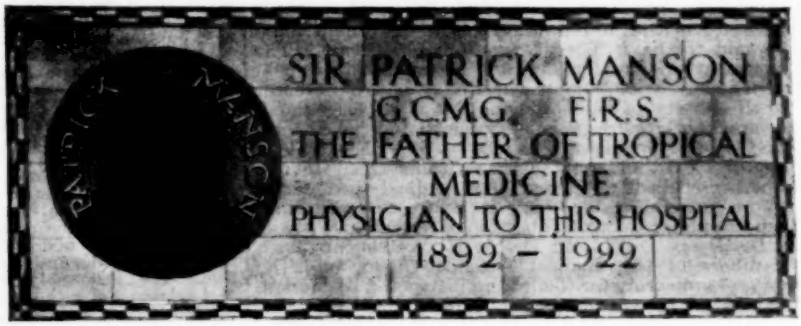
Dr. KATHERINE GAMGEE said that it was the children under four or five whose reaction was so different from that of adults. Older children than this gave a more or less adult reaction. She thought in rickets the time factor was important. Light sometimes worked amazingly where cod-liver oil failed, and was especially good for nervous children, and for nocturnal enuresis in particular. It was valuable in convalescence, and to prepare children for nose and throat operations. In anterior poliomyelitis, unless the child were submitted very early, it was disappointing. A small area of skin only should be dosed, and the place constantly varied. The body cells easily became stale, quite apart from pigmentation. There was an optimum for each case. She recommended courses of about six weeks, followed by a rest and another course. Light was a highly stimulating drug, of which the body cells soon became tired.

Dr. A. C. ROXBURGH said that the comparison between sunlight and artificial light was vitiated because the latter had to be given in a relatively stuffy atmosphere. He adduced, in support of the action of light being non-specific, figures showing how similar its results had been in tuberculous, non-tuberculous febrile, and non-febrile batches of patients. Referring to its dangers, he related how one patient with lupus and another with sarcoids had developed phthisis after carbon arc treatment. He had abandoned it for the treatment of dermatitis seborrhœica, and had found that psoriasis cleared up better with chrysarobin ointment.

Mr. H. J. CARDEW corroborated Dr. Sequeira's account of the good results obtained from the carbon arc given as a general bath in the treatment of keratitis, conjunctivitis, and other eye complaints.

UNVEILING OF MEMORIAL PLAQUE TO THE LATE SIR PATRICK MANSON BY THE MINISTER OF HEALTH.

AN appropriate and sympathetic ceremony took place on March 15th at the Albert Dock Hospital, London. The Minister of Health unveiled a memorial plaque to the late Sir Patrick Manson, the Father of Tropical Medicine, in the very ward in which, with the efficient aid of the Seamen's Hospital Society, Manson had established the clinical teaching of tropical medicine some 28 years ago. Sir Arthur Clarke, the chairman of the Seamen's Hospital Society, in introducing Mr. Neville Chamberlain, referred to the close association between Manson. the Chamberlain family, and this Society, and expressed the hope that this "family association" might continue. Mr. Chamberlain emphasised the bearing of the main discoveries of tropical medicine on the trend of medical science as a whole, and in doing so he showed himself to be familiar not only with the technical achievements, but with the personal attributes of Patrick Manson. He compared the historic association of Manson and Ross with that of Darwin and Wallace. Throughout his speech Mr. Chamberlain gave indications that the Minister of Health is fully alive to the paramount importance of tropical medicine in the Empire's affairs. Dr. George C. Low, the senior physician, in proposing a vote of thanks, laid special emphasis on the persistence of Manson, ably backed by Joseph Chamberlain, in face of official and professional opposition to his schemes. Prof. R. T. Leiper, F.R.S., in seconding this vote, paid a warm tribute to the personality of Sir Patrick Manson as portrayed in the recently published account of his life and to his genius in stimulating and encouraging research.



MEDICINE AND THE LAW.

THE HUME-SPRY CASE.

AFTER 15 days hearing the action brought by Mr. Frederick Hume-Spry against Dr. Robert Percy Smith, of Queen Anne-street, and Dr. A. H. Watson, of Salisbury, claiming damages for alleged negligence in certifying him insane, came to its only possible conclusion. The jury stopped the case, intimating that their unanimous verdict must be for the defendant doctors; Mr. Hume-Spry's counsel admitted that it was impossible for him to succeed; and Mr. Justice McCardie, who had tried the case with notable patience and judgment, explained that the verdict of the jury completely vindicated all those upon whose characters Mr. Hume-Spry had cast aspersions. The documents in the case are being retained in the custody of the Court so that the Director of Public Prosecutions may consider whether or not he will institute criminal proceedings against Mr. Hume-Spry for perjury or otherwise; it is perhaps unlikely, however, that a jury will be asked to fix a man of Mr. Hume-Spry's mental instability with criminal responsibility.

The issues involved in the recent action were unusually grave in their bearing upon members of the medical profession. The plaintiff complained that, in certifying him, the doctors had relied upon his having a fixed delusion that his wife had committed misconduct with Dr. Woods, medical superintendent of the Palmers Green Hospital, in which the plaintiff had been a Ministry of Pensions patient, and upon statements that he had tried to murder his wife and to commit suicide. He said he had reasonable grounds for believing that his wife had been unfaithful, he denied the attempted murder and suicide, and he said these facts would have appeared if the doctors had made proper inquiries. His counsel, speaking doubtless according to instructions, at first gave the impression that he definitely asserted Mrs. Hume-Spry's infidelity; the learned judge, indeed, seemed to expect that counsel would specifically cross-examine the witnesses against whom the plaintiff had made these allegations, as to actual times and places where the suggested misconduct had occurred. Later in the case it appeared that the plaintiff's counsel abandoned the assertion of misconduct and retired upon the safer position (untenable as the jury's verdict has established) that the conduct of the persons concerned was such that a sane man might reasonably have inferred misconduct. It was the plaintiff's view that the officials and doctors of the Ministry of Pensions had conspired wrongfully to send him to the asylum. For this suggestion, Mr. Justice McCardie declared emphatically, there was not the slightest foundation.

The proceedings will inevitably prompt the question how much longer a medical practitioner is to be exposed to attack for discharging duties which the Lunacy Law lays upon him, but which he cannot legally be compelled to perform. The Act of 1890 protects those who sign medical certificates of insanity if they have acted in good faith and with reasonable care. The Royal Commission, set up after the Harnett case, recommended that the *onus* of proving good faith and reasonable care should be shifted, and that, instead of the doctor having to discharge it, the complaining patient should be obliged to prove

bad faith and negligence. The distinction is not revolutionary. Another suggestion was made by Lord Sandhurst in the House of Lords debate on Earl Russell's motion (on Feb. 24th)—namely, that the damages recoverable for wrongful certification should be limited to the period of one month's detention, the fresh report at the end of the month being deemed to interpose a fresh responsibility. This would save the award of colossal damages as in the Harnett case (which is still before the House of Lords on legal questions concerning the effect of the Statute of Limitations and the Public Authorities Protection Act), but it would not have saved Dr. Smith or Dr. Watson from the annoyance and expense of defending themselves against Mr. Hume-Spry. The proper remedy is to realise that the reception of a lunatic takes place upon the direction of what the Act calls a "judicial authority." It is the magistrate's order, not merely the doctor's opinion, which counts. The authority of the magistrate was interposed by Parliament in days when the public, alarmed by the stories of Victorian novelists, believed madhouses to be full of sane persons illegally and improperly detained. The recent Royal Commission, Earl Russell has said, found no case in which a man could be said to have been wrongfully certified. The magistrate is, under the modern administration of the Lunacy Law, no longer necessary as the protector of the liberty of the subject. But if he is retained, he must take the responsibility for his judicial actions. And the public must decide whether it wishes to allow lunatics to wander at large without restraint, or whether it will support the medical profession, whose uncomfortable duty it is to contribute an expert opinion upon the question of restraint.

Dr. Percy Smith and Dr. A. H. Watson are both members of the Medical Defence Union, and the counsel appearing for them were instructed by Messrs. Hempsons, the solicitors to the Union.

Medical News.

UNIVERSITY OF OXFORD.—Under a bequest to the University made by the late Dr. Gustave Isidore Schorstein, assistant physician to the London Hospital, a Schorstein Research Fellowship in Medical Science is to be established and it is probable that an election will be made during the Summer Term. The proposed conditions were published in the *Oxford University Gazette* of March 16th.

Dr. Arthur Duncan Gardner, who is engaged in research in the department of pathology and bacteriology, and is bacteriologist in charge of the standards department of the Medical Research Council, has been elected to a special supernumerary Fellowship at University College.

UNIVERSITY OF LONDON: COURSE IN MENTAL DEFICIENCY.—A course of lectures for medical practitioners is to be held at the University of London, under the auspices of the Central Association for Mental Welfare, from May 23rd to 28th. The lecturers include Dr. A. F. Tredgold, Dr. F. C. Shrubsall, Prof. Cyril Burt, D.Sc., and Dr. W. Norwood East. Particulars may be had from Miss Evelyn Fox, c/o the University Extension Department, Imperial Institute-road, S.W. 7.

Examiners in Nursing.—At a recent meeting of the Senate the following were appointed examiners for the Diploma in Nursing:—(1) Scientific Basis and General Principles of Nursing: Miss T. J. Dillon, Miss W. A. Leyshon, Prof. R. H. A. Plimmer, Prof. C. K. Tinkler, Mr. H. P. Gilding, Miss Catherine Lewis, M.S., Dr. W. R. Spurrell, Prof. William Wright, F.R.C.S., Prof. W. Bulloch, M.D., F.R.S., Dr. R. G. Canti, Dr. C. E. Dukes, Dr. Joan Ross, Dr. J. A. H. Brincker, Dr. W. W. Jameson, Dr. Charles Porter, Dr. Ruth E. Proctor, Mr. F. A. P. Aveling, D.D., Prof. Beatrice Edgell, Mr. C. J. Flügel, and Dr. J. A. Hadfield; (2) History of Nursing to 1919 and Nursing Ethics: Miss Dorothy Coode, Miss Gertrude Cowlin, Mrs. Lucy Ridgly Seymer, and Miss Frances Sheldon. (3) General Nursing: Miss M. A. Gullan, Dr. C. E. Lakin, Miss E. McManus, and Miss G. M. Simms; (4) Obstetric and Gynæcological Nursing: Lady Barrett, M.S., Mr. A. W. Bourne, F.R.C.S., and Miss N. Newall; (5) Nursing of Children: Miss E. Cockeram, Miss A. M. Coulton, and Miss Alice M. Machell; (6) Mental Nursing: Miss E. L. Macaulay, Dr. W. F. Menzies, Prof. G. M. Robertson, F.R.C.P. Edin., and Miss M. M. Thorburn; (7) Fever Nursing and Epidemiology: Miss J. H. Balsillie, Dr. F. F. Caiger, Dr. Joseph Cates, and Miss L. F. Pearce; (8) Elementary Economics, Sociology and Hygiene: Dr. Joseph Cates, Mrs. E. A. Warren, and Miss H. Weir; (9) Hospital Administration: Sir Cooper Perry, M.D., Miss Lloyd Still, Mr. E. W. Morris, and Miss E. M. Musson; (10) Methods of Teaching: Prof. C. L. Burt and Miss K. L. Johnston.

UNIVERSITY OF MANCHESTER.—At recent examinations the following candidates satisfied the examiners:—

Diploma in Public Health.—N. S. Craig and T. N. Fisher.
Diploma in Psychological Medicine (Part I.).—Mary C. Luff.

ROYAL INSTITUTE OF PUBLIC HEALTH.—At the Whitsuntide Congress to be held at Ghent, Belgium, from June 1st to 6th, a special section will be devoted to industrial hygiene, and there will be discussions on industrial cancer, rheumatism, and temperature and humidity in industrial health. Dr. A. Vernon Davies, M.P., will be glad to hear from medical men and employers who would like to take part; communications may be addressed to him at the House of Commons, London, S.W. 1.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—On Thursday, March 31st, at 5 P.M., Dr. C. T. W. Hirsch will lecture and give a demonstration on Emergencies in Anæsthetics at the rooms of the Medical Society of London, 11, Chandos-street, Cavendish-square. On the same afternoon at 3 P.M. Mr. H. L. Attwater will give a clinical surgical demonstration at the All Saints' Hospital, Vauxhall Bridge-road, S.W. Both lecture and demonstrations will be free to members of the medical profession. From March 28th to April 9th the Queen's Hospital for Children will hold a special course; a programme occupying the whole day has been arranged and the chief feature of instruction at this hospital is the showing of cases rather than formal lectures. Also beginning on March 28th and continuing for two weeks, the Royal Eye Hospital staff will undertake a series of afternoon demonstrations on the Diagnosis and Treatment of Diseases of the Eye. The Fellowship can arrange practical courses in obstetrics and anæsthetics, and can also make arrangements for clinical assistantships in gynæcology. Copies of all syllabuses and of the *Post-Graduate Medical Journal* are obtainable from the Secretary of the Fellowship at 1, Wimpole-street, London, W. 1.

THE LATE DR. C. E. HUMPHREYS.—The death has taken place of Dr. Charles Evan Humphreys, of Macifod, near Welshpool, coroner for North Montgomeryshire, and medical officer of health and school medical officer for the county. After studying at the London Hospital, he qualified L.S.A. in 1883 and M.R.C.S. in 1884, taking the D.P.H. in 1911. Formerly in private practice at Welshpool Dr. Humphreys gave this up nearly 20 years ago to become medical officer of health. He effected great improvements in the health service of the county, more especially in the provision of district nurses and the medical inspection of schools. During the war he served in the R.A.M.C. (with the rank of Lieut.-Colonel) and acted as sanitary officer of the 68th Welsh Division and specialist sanitary officer at the Ripon Reserve Centre of the Northern Command. His two sons were also in the army.

SUSSEX HOSPITALS.—The Royal Alexandra Hospital for Sick Children, Brighton, admitted 1055 patients last year and 587 operations were performed. At the end of the year the general account was overdrawn by about £320, but money is being collected to build a new wing in memory of Queen Alexandra.—The New Sussex Hospital for Women and Children dealt with 491 in-patients and 13,403 out-patient attendances during the year. Income slightly exceeded expenditure, and the construction of a new wing, which will cost £10,000, is in progress.—The household box scheme has proved the salvation of Worthing Hospital, and £1432 was collected by means of it. There was a small deficit on the year's working, and the governors had to draw on capital to pay for extensions.—No less than 3931 women received attention from the Sussex Maternity and Women's Hospital at Brighton during 1926, 1106 being attended in their own homes, 1173 at the antenatal clinic, 702 in the out-patients' department, 71 in wards at the Hove branch, and 879 in the wards at Brighton, where 333 children were born. The governors consider that the hospital has outgrown its strength and are proceeding with enlargement.—As we have already stated, the Royal Sussex County Hospital is this year celebrating its centenary, and an appeal for £100,000 is being made to enable the governors to carry out large alterations.—A scheme has been started for increasing accommodation at Petworth Hospital at a cost of £3000. Lord Woolavington is giving £1000 on condition that the extension is at once begun.

UNIVERSITY OF ST. ANDREWS.—An anonymous donor has given £100,000 to the University, out of which the sum of £40,000 is to be set aside to found residential scholarships.

NAVAL MEDICAL COMPASSIONATE FUND.—A meeting of the subscribers of this Fund will be held at 11.30 A.M. on April 21st, at the Medical Department of the Navy, Queen Anne's Chambers, Tothill-street, Westminster, S.W.1, to elect six Directors of the Fund.

ROYAL NAVY MEDICAL CLUB.—The annual dinner will take place at the Trocadero Restaurant, Piccadilly Circus, W. 1, on Thursday, April 21st, at 7.30 P.M., for 8 P.M. Members who wish to be present are asked to inform the Hon. Secretary of the Club, Queen Anne's Chambers, Tothill-street, London, S.W. 1, not later than seven clear days before that date.

CONFERENCE ON MATERNITY AND INFANT WELFARE. Under the auspices of the Central Council for Infant and Child Welfare, and in connexion with the National Baby Week celebrations, a conference will be held in the hall of the British Medical Association, Tavistock-square, London, from July 5th to 7th, under the presidency of Mr. Neville Chamberlain, Minister of Health.

NORTH-WESTERN TUBERCULOSIS SOCIETY.—At the next meeting of this society, to be held on Thursday, March 31st, at 3.15 P.M., at the Public Health Laboratory, York-place, Oxford-road, Manchester, Prof. Lyle Cummins will read a paper on the Bearing of Recent Laboratory Research on Clinical Conceptions in Tuberculosis. The meeting will be open and the attendance of medical practitioners is invited.

SOCIETY FOR THE PROVISION OF BIRTH CONTROL CLINICS.—On Wednesday, March 30th, at 5.30 P.M., Lord Dawson will take the chair at a meeting in aid of this Society to be held by permission of Capt. Gerard Leigh at 16, Grosvenor-street, London, W.1. The speakers will be Mrs. Margaret Sanger (president of the American Birth Control League) and Mr. Harold Cox.

CLEAN AIR WEEK.—Smethwick in Staffordshire held a "Clean Air Week" from March 14th to 19th, during which period an effort was made to keep the atmosphere free from smoke. The campaign included demonstrations, lectures, and other forms of propaganda in which the Corporation Gas and Health Departments, and most of the large industrial firms in the district coöperated.

IRISH MEDICAL SCHOOLS' AND GRADUATES' ASSOCIATION.—The objects of the Association are (1) to support in every legitimate way efforts made to improve the status of the profession at large, especially of those holding Irish degrees or diplomas in medicine; (2) to promote social intercourse among those holding medical qualifications obtained in Ireland and others who have studied at an Irish school of medicine. The annual meeting and festival dinner takes place in London on St. Patrick's Day, and was held this year on Thursday, March 17th, at the Savoy Hotel, London, the President, Sir William de Courcy Wheeler, being in the chair. There was a good attendance, many ladies being present at what proved a very enjoyable function. There were only two toasts, "The Guests" and "The Prosperity of the Association." The toast of "The Guests" was proposed in a witty and unconventional speech by Colonel G. A. Moore, A.M.S. (retd.), who interspersed a cordial welcome of the guests with amusing Irish stories. Vice-Admiral Sir Frederick Field, Sir Squire Sprigge, and Dr. Bertram Watson returned thanks for the guests. Vice-Admiral Field held closely the attention of the company with a description of the happiness and prosperity that followed health developments in all parts of the world. He spoke of his experiences when in command of the Special Service Squadron during the world cruise of 1923–24, and instanced the vast benefits which had been received by populations in the ultimate regions of the Empire through the discoveries of medicine and through the faithful ministrations of doctors. The toast of the Association was proposed by Dr. Kenneth Fraser, who in coupling it with the name of the Chairman, spoke of Sir William Wheeler's valuable work in surgery and his position both in public and private. Sir William Wheeler, in reply, pointed out, with special reference to the position of the Irish Free State, that it was the great object of the President, fierce fighter as he had been in the past, to maintain the conditions of peace and good feeling which were already leading to prosperity. At the request of the company Colonel Moore continued his selection of Irish stories, which at various intervals in the proceedings were interspersed with songs from Miss Veronica Mansfield and Mr. Richard Watson, accompanied by Miss Nellie McCartney.

The honorary secretary of the Association, responsible for the dinner, was Dr. F. R. Holmes Meyrick.

UNIVERSITY OF DUBLIN.—Amongst the recipients of honorary degrees at the Summer Commencements on June 28th will be Sir Humphry Rolleston and Prof. Harvey Cushing.

HARVEIAN SOCIETY OF LONDON.—An ordinary meeting of this society will be held in the Paddington Town Hall on Thursday, April 7th, at 8.30 P.M., when a discussion on the treatment of Graves's disease will be opened by Mr. T. P. Dunhill, to be followed by Dr. C. M. Wilson and others.

UNIVERSITY OF DURHAM.—It is proposed that the honorary degree of Doctor of Civil Law shall be conferred at the June Convocation upon Sir James Berry, consulting surgeon to the Royal Free Hospital, London, and President of the Royal Society of Medicine.

UNIVERSITY COLLEGE HOSPITAL.—At the annual general meeting on March 24th it was stated that nearly 10,000 visits were paid to mothers in their own homes by the health visitors from the Infant Welfare Department. For the sum of £20,000 a building at the back of the Obstetric Hospital could be converted into headquarters for the Centre. Out-patients' attendances at the hospital approached 250,000 during the year, and the number of in-patients increased by about 600.

HOSPITAL OF ST. CROSS, RUGBY.—In memory of her husband Mrs. Arthur James is presenting to this hospital a complete out-patients' department, with minor operating, dental, and recovery rooms. The block which is to be built forthwith will be arranged to allow of extension.

A SHEFFIELD HOSPITAL AREA.—A conference of local hospital authorities has decided in favour of a system of coöperation and coördination, with Sheffield as the pivot of the scheme. The area concerned includes Barnsley, Mexborough, Doncaster, Denaby, Rotherham, Worksop, Retford, Bakewell, and Chesterfield.

MEDICAL STUDENTS VISIT A SPA.—Students from the University of Birmingham, accompanied by Prof. Douglas Stanley and other members of the staff, went to Bath on March 19th and visited the bathing establishment and Royal Mineral Water Hospital. A short address was given by Dr. A. Gordon Watson, and cases were demonstrated by Dr. Rupert Waterhouse, Dr. R. G. Gordon, Dr. James Lindsay, Dr. H. Clulow Nixon, and Dr. J. Litt.

MANGANESE POISONING.—At Stroud County Court on March 15th Judge Alan Macpherson recorded agreements for the payment of lump sums of £800 and £750 respectively, as compensation to two men suffering from manganese poisoning contracted whilst at work for a paint and varnish manufacturer.

MILK PASTEURISATION AND HUMANE SLAUGHTER.—On March 17th a large party of veterinarians and medical men set out in charabancs from the Royal College of Veterinary Science and visited the pasteurising plant of Messrs. Curtis Bros. and Dumbrill, at Valley Farm Dairy, Streatham. The arrangements were made by Prof. F. T. Hobday, and amongst those present were Sir D'Arcy Power, Major-General Sir John Moore, Prof. G. H. Wooldridge, Dr. E. G. Gibbs-Smith, and Lieut.-Colonel T. Dunlop Young. After being shown the working of the pasteurising plant, which is a model of efficiency and is always open to public inspection, the party was entertained to tea by Messrs. Curtis Bros. and Dumbrill. Mr. P. B. Tustin, in welcoming the guests, asked for their interest in the Young Farmers' Club Movement inaugurated by United Dairies to teach the sons and daughters of farmers kindness to animals, clean and economical milk production, and the proper feeding and judging of dairy animals. Prof. Hobday, Sir John Moore, Prof. Wooldridge, and Colonel Young expressed their satisfaction with the conditions of work at the Valley Farm Dairy, and thanked Mr. Tustin for the careful explanation of methods which had been given. After leaving the dairy, the party visited a local butcher's shop where Mr. Weinberg gave a demonstration of his method of slaughtering cattle for Jewish consumption. According to Jewish law the animal must be killed by cutting the throat, only one cut being made, and no previous stunning being allowed. This involves extension of the head on the neck, and in killing bullocks it is usual to tether their legs, throw the animals heavily to the ground, and wrench back their heads. A horn is often broken off during this procedure. Mr. Weinberg's apparatus is designed to obviate brutality. It consists of a wooden cage pivoted on a frame; the cage, when the animal has entered, is suddenly reversed so that the bullock is now resting on its back. At this stage it is probably confused and dizzy and the neck is fully exposed to the knife, no wrenching being necessary. This method was satisfactorily demonstrated and was generally considered more humane than those in use at present. The limitations of the Streatham slaughter-yard unfortunately made it impossible to withdraw the carcass yard unfortunately made it impossible to withdraw the carcass expeditiously, so that the time occupied in the whole performance could not be estimated exactly.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MONDAY, March 28th.—8 P.M., ODONTOLOGY. Paper: Mr. D. Stewart (Manchester University): Some Aspects of the Innervation of the Teeth. Casual Communication, Mr. T. B. Layton: Osteomyelitis of the Upper Jaw in Scarlet Fever.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.

TUESDAY, March 29th.—5 P.M., Sir Charlton Briscoe: The Muscular Mechanism of Respiration and its Disorders (Last Lumleian Lecture).

ROYAL NORTHERN HOSPITAL POST-GRADUATE COURSE.

TUESDAY, March 29th.—3.15 P.M., Dr. E. G. B. Calvert: The significance of (1) Glycosuria, (2) Albuminuria: Main Points in Diagnosis and Treatment.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.

MONDAY, March 28th.—5 P.M., Mr. C. E. Shattock: Veins and Lymphatic Vessels.

FRIDAY, April 1st.—5 P.M., Prof. Sir Arthur Keith: The Anatomy and Physiology of the Gall-bladder.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, March 28th.—10 A.M., Mr. MacDonald: Genito-Urinary Operations. 2 P.M., Mr. Addison: Surgical Wards. 4 P.M., Dr. Saunders: Jaundice.

TUESDAY.—10 A.M., Medical Registrar: Clinical Methods. 12 noon, Dr. Burrell: Chest Cases. 2 P.M., Mr. Sinclair: Surgical Out-patients.

WEDNESDAY.—10 A.M., Dr. Owen: Medical Diseases of Children. 2 P.M., Dr. Scott Pinchin: Medical Out-patients. Mr. Donald Armour: Surgical Wards.

THURSDAY.—10 A.M., Dr. Stewart: Neurological Department. 12 noon, Mr. Simmonds. Demonstration of Fractures. 3 P.M., Sir H. Simson: Gynæcological Ward.

FRIDAY.—11 A.M., Dr. Pritchard: Modern Methods in Medicine. 2 P.M., Mr. Sinclair: Surgical Out-patients.

SATURDAY.—9.30 A.M., Dr. Burnford: Bacterial Therapy. 10 A.M., Dr. Owen: Medical Diseases of Children.

Daily.—10 A.M. to 5 P.M., Operations, Medical, Surgical, Special, Out-patient Departments (Saturdays, 10 A.M. to 1 P.M.)

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, March 28th, to SATURDAY, April 2nd.—FELLOWSHIP OF MEDICINE. Special lecture-demonstration at the Medical Society, 11, Chandos-street, Cavendish-square, W., at 5 P.M., on Thurs. Dr. Hirsch: Emergencies in Anæsthetics. Open to all members of the medical profession, without fee.—ALL SAINTS' HOSPITAL, Vauxhall Bridge-road, S.W. Thurs., 3 P.M., Mr. H. L. Attwater: Special demonstration (genito-urinary), free to members of the medical profession.—LONDON TEMPERANCE HOSPITAL, Hampstead-road, N.W. 4.30 to 6 P.M., General Practitioners course. Medicine, Surgery, and the Specialties.—QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, Bethnal Green, E. All day course, the chief feature of which will be the showing of cases.—ROYAL EYE HOSPITAL, St. George's Circus, Southwark, S.E. Afternoon demonstrations on the diagnosis and treatment of diseases of the eye.—ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, W. Comprehensive course. Morning and afternoon sessions, including Saturday.

Further information from the Secretary.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.

MONDAY, March 28th.—10 A.M., Surgical Clinic. 2 P.M., Medical Cases in the Wards. 2.30 P.M., to 5 P.M. Medical, Surgical, and Gynæcological Clinics. Operations.

TUESDAY.—2.30 P.M. to 5 P.M., Medical, Surgical, Throat, Nose, and Ear Clinics. Operations.

WEDNESDAY.—2.30 P.M. to 5 P.M., Medical, Skin, and Eye Clinics. Operations.

THURSDAY.—11.30 A.M., Dental Clinic. 2.30 P.M. to 5 P.M., Medical, Surgical, and Ear, Nose and Throat Clinics. Operations.

FRIDAY.—10.30 A.M., Throat, Nose, and Ear Clinics. 2.30 P.M. to 5 P.M., Surgical, Medical, and Children's Diseases Clinics. Operations.

On TUESDAY, March 29th, and THURSDAY, March 31st, at 2.30 P.M., there will be special demonstrations of Medical and Surgical Cases by Mr. W. F. Tanner and Dr. A. J. Whiting respectively.

Also on FRIDAY, April 1st, at 4.30 P.M., Dr. L. R. Yealland will demonstrate on Selected Cases of Nerve Disease.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, W.C.

FRIDAY, April 1st.—4 P.M., Dr. Dan McKenzie: Diathermy in the Treatment of Cancer in the Pharynx.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.

THURSDAY, March 31st.—4 P.M., Mr. Tyrrell Gray: Abdominal Pain.

LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.

TUESDAY, March 29th.—5 P.M., Dr. G. B. Dowling: Scleroderma. Neurofibromatosis.

PEOPLE'S LEAGUE OF HEALTH. (Sims Woodhead Health Lectures.)

MONDAY, March 28th.—6 P.M. (at the Medical Society of London 11, Chandos-street, W.), Sir Robert Armstrong-Jones: Brain and Nervous Systems.

ANCOATS HOSPITAL, POST-GRADUATE LECTURES, Mill-street, Manchester.

THURSDAY, March 31st.—4.15 P.M., Dr. W. J. S. Reid: Tabes Dorsalis.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE LECTURES.

TUESDAY, March 29th.—4.15 P.M., Mr. H. H. Rayner: Pulmonary Embolism.

FRIDAY, April 1st.—4.15 P.M., Mr. C. Roberts: Demonstration of Surgical Cases.

ST. MARGARET'S HOSPITAL FOR WOMEN, Acomb-street, Whitworth Park, Manchester.

WEDNESDAY, March 30th.—12 noon, Mr. A. C. Magian: Demonstration Operation on Ovarian Grafting.

Appointments.

GILMORE, E. R. W., M.B., Ch.B. Manch. D.P.H. Lond. and Manch. D.T.M. Liverp., has been appointed Assistant School Medical Officer to Education Committee, City of Salford.

READER, N. L. M., M.D. Lond., F.R.C.S. Eng., Surgeon to the Barry Accident and Surgical Hospital.

Surgeons under the Factory and Workshop Acts: PURCELL, M., M.B., Ch.B. N.U.I. (Silsden, York); KILLICK, C. F. R., M.B., Ch.B. Brist. (Williton, Somerset); RICHMOND, A. H. D. O. (Presteign, Radnor); M.B., Ch.B. Edin.; HOBBS, F. B. M.D., B.Ch. Camb. (Farnham).

Vacancies.

For further information refer to the advertisement columns.

Barrow-in-Furness, North Lonsdale Hospital.—H.S. £130.

Belgrave Hospital for Children, Clapham-road, S.W.—Hon. Radiologist. 50 guineas.

Birkenhead General Hospital.—Cas. H.S. £100.

Brentwood, Essex, High Wood Hospital for Children.—Jun. Asst. M.O. £500.

Carlisle Union and Carlisle Rural District Council.—M.O. About £800.

Charing Cross Hospital, W.C.—Asst. Obstet. P.

Chelsea Hospital for Women, Arthur-street, S.W.—Hon. Genito-Urinary S.

Exeter, Royal Devon and Exeter Hospital.—Res. Cas. O. At rate of £100

Glasgow, Gartloch Mental Hospital, Gartcosh.—Jun. Asst. M.O. At rate of £300.

Grimsby and District Hospital. Sec. Supt. £300.

Halifax Royal Infirmary.—Third H.S. At rate of £100.

Hertford County Hospital.—H.P. At rate of £150.

Hospital for Epilepsy and Paralysis, Maida Vale, W.—Res. M.O. and H.P. At rate of £150 and £100 respectively. Also Hon. Gynæcologist.

Hospital for Sick Children, Great Ormond-street, W.C.—H.S. Also H.P. and Asst. Cas. O. Each at rate of £56.

Hull Royal Infirmary.—Hon. Phys. and Hon. Asst. S. to Nose, Throat, and Ear Dept.

Leeds General Infirmary.—Asst. M.O. in Venereal Dis. Dept. £500.

Liverpool and District Hospital for Diseases of the Heart, 34, Oxford-street.—H.P.

Malayan Medical Service.—M.O's. $500 per mensem.

Manchester, Monsall Hospital for Infectious Diseases.—Two Jun. Med. Assts. Each £350.

Maudsley Hospital, Denmark Hill, S.E.—Asst. M.O. £504.

Metropolitan Hospital, Kingsland-road, E.—H.P.'s., H.S.'s., and Two Cas. O's. At rate of £100.

Middlesex Hospital, Mortimer-street, W.—Asst. Radiologist. £100.

Northumberland County Council and Urban District Council of Newburn.—Asst. County M.O.H., &c. £700.

Paddington Green Children's Hospital, W.—H.P. and H.S. Each £150.

Plymouth, South Devon and East Cornwall Hospital.—Cas. H.S.
Poplar Hospital for Accidents, East India Dock-road, Poplar, E.—Second Res. O. £175.
Reading, Royal Berkshire Hospital.—H.S. £150.
Rochford Hospital.—Asst. Res. M.O. £175.
Samaritan Free Hospital for Women, Marylebone-road, N.W.—Hon. Surg. to Out-patients.
Sheffield Royal Hospital.—Sen. Cas. O. £150.
Sheffield Royal Infirmary.—H.S. At rate of £80.
St. John's Hospital, Lewisham, S.E.—Res. Cas. O. At rate of £100.
University of London, South Kensington, S.W.—Chair of Anatomy. £1000.
York County Hospital.—H.P. £150.

The Chief Inspector of Factories announces a vacancy for a Certifying Factory Surgeon at Porlock (Somerset.)

The Secretary of State for the Home Department gives notice of a vacancy for a Medical Referee under the Workmen's Compensation Act, for the Districts of the Bangor, Conway, Llandudno and Colwyn Bay, and Llanrwst County Courts (Circuit No. 29). Applications should reach the Private Secretary, Home Office, not later than April 6th.

Births, Marriages, and Deaths.

BIRTHS.

ELKINGTON.—On Feb. 23rd, at Bruton, Somerset to Kathleen, wife of Dr. Guy W. Elkington—a son.

HIGGINS.—On March 15th, at a nursing home, the wife of Lionel G. Higgins, F.R.C.S., of Linkwood, Woking, of a son.

PANTON.—On March 17th, at Bovington Camp, Wareham, Dorset, the wife of Captain D. F. Panton, R.A.M.C., of a son.

MARRIAGES.

HAYDON—RICHMOND.—On March 17th, at St. Peter's Church, Cranley-gardens, Leonard John Haydon, M.R.C.S., L.R.C.P., to Susan Eleanor Richmond, youngest daughter of Mr. and Mrs. D. C. Richmond, of Cornwall-gardens, S.W.

DEATHS.

BURD.—On the 21st inst., at Mornington, Richmond-road, Malvern Link, Cyril Prichard Burd, M.R.C.S., L.R.C.P., aged 51 years.

DAY.—On March 17th, suddenly, at Caunce-street, Blackpool Percy Howard Day, L.R.C.P., L.R.C.S. Edin., aged 70.

PALMER.—On March 15th, after two days' illness, (pneumonia following influenza), at Marine-avenue, Hove, Harry Palmer, M.R.C.S., L.R.C.P. Lond.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

RICE IN SHREDDED SUET.—At Stoke-on-Trent on March 18th the Potteries stipendiary magistrate dismissed the cases against four firms summoned for selling shredded suet adulterated with an excessive quantity of ground rice (THE LANCET, Feb. 12th, p. 372). The prosecution had alleged that 15 per cent. of ground rice was ample, and that in samples taken from the defendants' shops this quantity had been exceeded. The magistrate held that 15 per cent. was sufficiently high, but suggested that in view of manufacturing difficulties food inspectors should not trouble about relatively small percentages over that standard.

SPINNER'S CANCER.—Dr. J. C. Beckitt, medical officer of health for Leigh, Lancashire, stated on March 18th, in a lecture at Leigh, that since the war 539 cases of spinners' cancer had been traced in Lancashire and Yorkshire alone. Between 1911 and 1920, 486 males had died of cancer of the scrotum, and of these 100 were operative cotton-spinners, whilst the remainder included 52 general labourers, 41 chimney sweeps, 11 dock labourers, 10 chemical workers, 11 coal-miners, and 11 gasworks hands. Deaths were thus more prevalent among cotton-spinners than any other workers. The disease usually showed itself between the ages of 35 and 55, and not until the person had been employed in the mule room for ten years at least. Change of occupation was no guarantee that it would not occur. Indeed the malignant growth might not appear until a considerable time after employment in a mule room had ceased. The greater the amount of oil soaking into the clothing the greater was the danger. Cleanliness was all essential, and Dr. Beckitt recommended the wearing of protective clothing in the form of an apron impervious to oil.

Notes, Comments, and Abstracts.

PYELOGRAPHY AND ITS VALUE IN DIAGNOSIS.

Being an Address delivered before the Brighton and Sussex Medico-Chirurgical Society

BY F. E. FEILDEN, F.R.C.S. EDIN., M.R.C.S. ENG.,
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PYELOGRAPHY is the radiographic examination of a solution, opaque to X rays, which has been introduced into the renal pelvis and ureter. I know of no branch of surgery that possesses more accurate means of diagnosis than urology, and, of these, I believe pyelography to be one of the most important.

Abdominal pain, whether acute or chronic, may be due to some pathological condition of the upper urinary tract, although urinary symptoms and gross changes in the urine are absent. On the other hand, certain cases present urinary symptoms, although the causative lesion is to be found outside the urinary tract.

It is in such cases of obscure ætiology that pyelography is of special assistance, and whenever there is abdominal pain of doubtful origin pyelography should be done, unless a diagnosis can be established by other less elaborate and special means.

It was in 1905 that Hurry Fenwick introduced the opaque ureteric bougie which preceded the use of a solution for rendering the outline of the pelvis and ureter visible in radiograms. The value of the method was slow to be appreciated, and at first received but scant attention; and even now, although pyelography has received wide recognition, it is not, I think, employed often enough nor is its value sufficiently understood. It should not be looked on as an infallible method of arriving at a correct diagnosis, but, as with every other method of urological investigation, the diagnosis should be reached only after careful consideration of both the radiographic and the clinical picture. In certain instances, however, pyelography may be the *only* means, short of an exploratory operation, of solving a clinical problem.

Interpretation of the Pyelogram.

In cystoscopy the greatest difficulty lies in the interpretation of the picture, and the same is true in pyelography. It is, therefore, essential to become thoroughly familiar with the normal pyelogram, for by so doing we shall more readily appreciate deviations from normal, and consequently be in a position to state with confidence that a given pyelogram represents a pathological condition of the pelvis or kidney. This is very important. For example: a man presents himself with a history of hæmaturia; radiography and bacteriological examination of the urine do not throw any light on the cause, and cystoscopy fails to reveal any lesion in the bladder or ureteric orifices. Not infrequently, in such a case, the patient is told to come up again when he is bleeding so that the operator may see which kidney is giving rise to the hæmorrhage. In my opinion this enforces an unnecessary delay, which may be greatly jeopardising the patient's chance of recovery. There should be no waiting; a right- and left-sided pyelogram should be taken so that many of the causes of hæmaturia of renal origin can be at least eliminated, and the cause of the symptoms may, perhaps, be dramatically revealed.

In reading a pyelogram the following points should be borne in mind. The normal pelvis is trumpet-shaped, and is set almost vertically on the upper end of the ureter; the calyces project from it laterally, some of them in an anteroposterior direction. The normal major calyx divides into minor calyces, which have a cup-shaped extremity, in the hollow of which lies the pyramid. Calyces, seen on end, appear as round, darker patches, and should not be mistaken for calculi. Normally the catheter passes from the ureter to the pelvis and then into the upper calyx; the expansion of the ureter into the renal pelvis is a gradual transition, and there should be no line of demarcation. It should be remembered that the right pelvis lies at a slightly lower level than the left; when the left is lower than the right there is some pathological reason for it; when either lies below the level of the third lumbar vertebra, the condition is abnormal.

In addition to the ordinary anteroposterior view of the kidney, a lateral picture may be taken; it will then be noticed that in this pyelogram the kidney pelvis lies in the shadow of the second and third lumbar vertebræ, and the calyces are spread out laterally from the pelvis. The pelvis appears

pear-shaped, the stalk of the pear representing the ureter, which becomes anterior to the spine at the level of the fourth lumbar vertebra. It is important to remember this relationship of the pelvis to the vertebræ when differentiating between shadows in the renal area. In a lateral view the shadow of a renal calculus will lie on the shadow of the vertebræ, except in the case of a large stone or a collection of stones with associated enlargement of the kidney, when it may be anterior to the vertebræ.

Identification of Stones.

As a result of the greatly improved technique of radiography, gall-stones may now be demonstrated on the X ray plate and may have to be distinguished from other opacities in the renal area. The questions, therefore, which have to be settled in the interpretation of a shadow in the renal area are: (1) is the shadow intra- or extra-renal? and (2) what is its exact position? A pyelogram will assist us to answer both these questions. In many cases there is no element of doubt as to the character and position of a shadow in the renal area, but sometimes, in spite of the data supplied by the clinical history, and in spite of cystoscopy and catheterisation of the ureters, the ordinary radiogram cannot be interpreted with confidence. When a stone of any appreciable size is in the kidney, a variable degree of dilatation of the entire pelvis or individual calyx may be demonstrated in the pyelogram; the changes may be the result of mechanical obstruction or inflammatory reaction, or a combination of both. It must be remembered, however, that a stone may produce little or no apparent deformity. Moreover, a stone in the pelvis may block the entrance of the opaque solution, so that there will be a ureterogram but no pyelogram.

Here may be mentioned a point of considerable importance in pyelography for cases of suspected renal calculi—namely, the staining of stones.

Uric acid calculi produce a particularly feeble shadow in a radiogram, and, as I have already said, the pyelogram may not reveal the condition; but if the opaque solution is withdrawn and a further picture taken after the lapse of, say, half an hour, there will be no difficulty in at once recognising the presence of the calculus.

In a lateral radiogram the shadow of a gall-stone lies well in front of the vertebræ and, more often than not, on a lower plane than a renal shadow. In cases of doubt a pyelogram settles the point. Not infrequently there is difficulty in distinguishing between calcareous mesenteric or lumbar glands and a stone in the pelvis or ureter. The relation of the ureter to the opacities can be shown by the introduction of an opaque catheter into the ureter, and a pyelogram will demonstrate that the shadows are extra-renal. If there is still an element of doubt, a lateral pyelogram will indicate that the opacities are outside the urinary tract.

Hydronephrosis and Nephroptosis.

The diagnosis of a large hydronephrosis is not usually difficult, but there is a period in its development when the kidney is not obviously enlarged and may not even be felt; it is in this early stage that it is so important to arrive at the diagnosis before the kidney becomes the seat of sepsis, and irreparable damage has been done.

It is in this early stage, when there are symptoms suggesting distension of the renal pelvis, that pyelography is of such value. In early hydronephrosis there is broadening and flattening of the major calyces, and loss of the terminal irregularities of the minor calyces.

Congenital hydronephrosis is by no means an uncommon condition, and one frequently giving rise to hæmaturia. It not infrequently happens that an early case of hydronephrosis, producing hæmaturia, can be diagnosed by no other methods of investigation. Probably bleeding diagnosed as "Essential hæmaturia" is often due to hydronephrosis, and if pyelography is performed, this error in diagnosis would be discovered and the appropriate treatment adopted. In these cases of so-called essential hæmaturia, the demonstration of a normal pelvis by pyelography is of very definite value, excluding, as it does, many of the causes of blood in the urine. Pyelography is undoubtedly useful in determining the cause of hæmaturia in cases where the ætiological factor cannot be otherwise ascertained.

Nephroptosis usually presents no particular difficulty in diagnosis, but it is important to know whether or not the ureter is associated with kinking. A pyelogram will show this. In those cases where a bilateral pyelogram demonstrates a bilateral nephroptosis, unassociated with kinking of the ureter and with no resulting hydronephrosis, I think that there is a very definite doubt as to the advisability of operative interference.

Neoplasms and Tuberculosis.

Clinically, the differential diagnosis of a neoplasm, pyonephrosis, and hydronephrosis may be extremely difficult, especially when an impassable obstruction is found in the upper urinary tract; if such is the case, although none of the injected solution enters the pelvis, the outline of the ureter is still of value, for a dilated ureter from ureteritis suggests an enlargement of the kidney from infection.

With the outline of a small ureter below the tumour, a neoplasm may be inferred, the ureter being atrophied from disuse.

In a large percentage of cases of new growth of the kidney, pyelography will show a recognisable change in the renal pelvis. There are occasions, however, when this method will not be of use except in a negative sense. I have in mind a sarcoma of the renal capsule which is not invading a calyx and is not palpable. In such a case a radiogram taken after perirenal infiltration with oxygen may be of value, for an alteration, produced by the tumour, may then be seen in the contour of the kidney.

In tuberculous disease of the kidney, cystoscopy and catheterisation of the ureters will often give the diagnosis or confirm suspicions, but here again it is sometimes necessary to rely on pyelography.

To illustrate this point I will refer to three recent cases: The first was that of a man, aged 32, who for several months had been troubled with pain in the back; this he attributed to a motor-cycle accident which he had nine months before I saw him. He also stated that on one occasion he noticed blood in his urine. I submitted him to the usual routine investigation. Cystoscopy was negative; I catheterised both ureters, and the urine from each kidney revealed nothing. I then took a pyelogram, and the resulting picture left no doubt in my mind that there was a tuberculous infection of the left kidney. A nephrectomy was performed, and the pathological report confirmed the clinical diagnosis.

The other two cases were very similar from the history, except that in one the cystoscopic picture showed, according to my notes, "a granular type of cystitis, suggestive of, but not typical of, a tuberculous infection." In all three the urine was negative for tubercle bacilli, and in all three the diagnosis, as suggested by pyelography, was confirmed at operation.

These cases proved to me the extreme value of pyelography as an aid in arriving at an early and accurate diagnosis. Especially is this important in cases of tuberculous disease of the kidney, when we realise these patients not infrequently complain merely of frequency of micturition, the duration of which may only be a matter of weeks. Much valuable time may be saved, and thereby the patient's chances of recovery enhanced, by a speedy decision as to the correct line of treatment to adopt.

Technique of Pyelography.

I think it is certainly preferable that pyelography should be carried out without general anæsthesia whenever possible. This enables the patient to indicate to the surgeon when the renal pelvis is full. Distension of the pelvis causes pain, which will increase to a colic if distension is continued.

Personally I like to screen the patient and watch the fluid filling up the pelvis, so that I do not have to rely entirely upon the patient for information as to when the pelvis is full, for one pelvis may not be as sensitive as another.

The fluid in the renal pelvis should be withdrawn before introducing the solution; unless this is done, inconvenience may be caused by the dilution of the opaque solution. It is advisable to use an opaque catheter of moderate size so as not to fill the lumen of the ureter completely; this is an additional safeguard against over-distension of the pelvis. It is well to avoid injecting the fluid when the eye of the catheter is in a calyx, for if this occurs, the pelvis may be only partly filled when pain is complained of, owing to distension of the calyx. In certain cases it is an advantage gradually to withdraw the catheter and inject the solution so that the course and contour of the ureter may be seen. At the same time it should be borne in mind that the ureter, being freely movable, can easily be made to follow an unusual course by injecting fluid when the tip of the catheter is low down in the ureter.

When the exposure has been made the solution should be removed from the pelvis. From the patient's point of view this obviates any unnecessary discomfort.

Conclusion.

Undoubtedly the most valuable possession we have for investigating the ætiological factors of disease are experience and careful observation, and interpretation of the patient's signs and symptoms. At the same time, when we have in our hands such an accurate, safe, and reliable method of investigation as pyelography, there should be no hesitation to employ it.

It gives me the greatest pleasure to acknowledge my indebtedness to Mr. A. E. Webb-Johnson for his constant encouragement and advice at all times; and to Dr. F. G. Nicholas my thanks are due for his valued coöperation in the X ray department of the Middlesex Hospital.

THE SALE OF MEAT.

CONFERENCE AT ROYAL SANITARY INSTITUTE.

A CONFERENCE on the Public Health (Meat) Regulations 1924, which came into force on April 1st, 1925, was held recently at the Royal Sanitary Institute. Alderman W. PHENÉ NEAL (City of London) occupied the chair.

Mr. W. BRENNAN DE VINE (Veterinary Superintendent, Birmingham) said that lack of uniformity in carrying out the regulations in the different administrative areas had caused considerable dissatisfaction in the meat trade. The definition of meat should include poultry, rabbits, cooked and decanned meat. The adhesive surfaces presented by skinned rabbits and butter caused dirt to stick to them more than to butchers' meat often sold from the same shop; this unequal treatment caused adverse comment. Cooked meat and meat removed from a tin were a greater source of danger of food poisoning than butchers' meat.

The requirement of giving notice of slaughter saved the time of the meat inspector. Illicit slaughtering was, however, going on in places other than recognised slaughter-houses, and local authorities and magistrates should be informed by the Ministry of Health that this was a serious offence. Notification of disease in slaughtered animals was frequently evaded by cottagers, small-holders, and farmers who only slaughtered a few animals at intervals. The regulation requiring that a slaughter-house should be used only for slaughtering had enabled the Birmingham authorities to improve conditions in a number of places used on one day in the week as a slaughter-house, on another as a wash-house, and for the rest of the week as a lumber store. The power to prohibit the use of a slaughter-house for gut-scraping and tripe-cleaning, in order to prevent the fæcal contamination of carcasses, was in itself worth the whole of the expense entailed in carrying out the regulations. Only a few local authorities had been able to persuade their butchers to accept the system of marking every inspected carcass, yet this was widely carried out on the continent.

Stalls and shops should be required to provide glass windows; he had seen in Rotterdam meat stalls in which all the meat was kept and exhibited behind glass. Meat hawkers should be licensed; to protect the meat all the time their storage-places should be registered so as to facilitate inspection. In Birmingham there was no meat hanging outside a stall or shop; although it was recognised that a local authority had no power to compel the provision of glass windows, the meat was kept behind glass in 90 per cent. of the shops. The efforts of local authorities to obtain glass fronts had been nullified by Circular 604 which stated that not all butchers' shops need be so provided. But all butchers who had studied the question from the economic standpoint kept their meat behind closed glass windows and so prevented the meat losing its bloom when it had to be sold at a cheaper rate; the loss of weight by evaporation of water was avoided and the meat kept longer. In Birmingham two firms, one with 50 branches the other with 40 branches, had provided fixed closed glass windows. No loss of trade occurred when the practice of hanging up meat outside shops was given up. Circular 604 stated that where meat has to be kept near to an open window the general rule should be that it should be covered with clean muslin or other suitable material, but when a brisk trade is being carried on this precaution may have to be suspended so that meat may be readily accessible. No definition of brisk trade was given. Some butchers, if shouting their wares in a crowded street, would claim they were carrying on a brisk trade even though customers were few. The supposition that there was a brisk trade every Saturday night had been extended to cover Friday night, then Thursday night, and finally every night in the week. The regulations dealing with the transport and handling of meat were admirably carried out by the wholesalers.

Discussion.

Dr. CHARLES PORTER (Medical Officer of Health, Marylebone) held that meat was an article of food which should not be sold in the gutter even from behind a glass window. Meat could be sold without being displayed; in the United States it was only in the poorer quarters of large towns that meat could be seen on sale at all. When the regulations were drawn up they had caused the usual trouble produced by all new legislation; the public health world had hoped too much; the butchers had feared too much from them. The benefits they would produce were only beginning.

Mr. J. S. LLOYD (Chief Veterinary Inspector, Sheffield) considered that no food should be displayed for sale in such a way as to allow contamination. He had experienced difficulty owing to the absence of a definition of a shop. Meat-marking in Sheffield was only carried out for horseflesh to be sold abroad. He had persuaded stallkeepers to put glass tops over their counters. Flies could be got rid of in shops by installing fans.

Mr. J. A. DIXON (Veterinary Inspector, Leeds) said that the right of pig-keepers and small-holders to slaughter elsewhere than in a slaughter-house resulted in much unsatisfactory meat being consumed, and the wholesalers complained. The notification of emergency slaughter was largely ignored. He disapproved of the blowing of meat by any method. Meat-marking would shield from prosecution butchers who had bought meat with deep-seated undetected disease. No butcher repented of having fitted a fixed glass window. It should be made clear that retailers' men were required to wear protective clothing when handling meat.

Mr. W. G. COLLINGE (National Federation of Meat Traders Association) expressed his personal view that all foodstuffs should be required to be protected from contamination. Many butchers believed that meat should be exposed to a draught and so preferred the open window. The way in which meat was sold in many parts of London to-day was a disgrace.

Councillor J. EDWARDS (Hornsey) agreed. In some shops on Saturday nights meat was hung six to nine feet outside the shop on the edge of the spring blinds.

Mr. T. TOPPING (Chief Sanitary Inspector, Rochester) thought that the regulations made as big a step forward at one time as could be expected. The staff usually provided did not enable the regulations to be enforced.

Lieut.-Colonel T. DUNLOP YOUNG (Chief Veterinary Inspector, Smithfield Market) said that compulsory meat-marking should be instituted to prevent the waste of time and money resulting from meat being inspected officially several times.

Mr. BRENNAN DE VINE, in reply, said that the inspector who visited many butchers' shops in a day could give a sounder opinion on the way to prevent contamination by flies and dirt than the butcher who remained in one shop all day long. The open shop had the most flies. Sunday morning and late Saturday night trade should be wiped out; there was none in Birmingham.

On the motion of Colonel YOUNG, seconded by Dr. G. CLARK TROTTER (Medical Officer of Health, Islington), it was resolved that application should be made to the Ministry of Health for a complete revision of the Meat Regulations, this revision being made after consultation with all the trades concerned.

THE QUALIFICATIONS OF PUBLIC ANALYSTS.

THE Minister of Health has laid down that if a person appointed as public analyst does not already hold such an appointment he must provide documentary evidence of competence in analytical chemistry, therapeutics, and microscopy. The Minister will accept the Fellowship of the Institute of Chemistry with the certificate granted by that body in the chemistry (including microscopy) of food, drugs, and water. The medical diploma of a registered practitioner is accepted as sufficient evidence of competence in therapeutics and microscopy, but he will be required to furnish evidence of competence in analytical chemistry. These requirements recognise the limitations of the chemist with the usual training, who does not necessarily know anything about therapeutics or the microscopy of food and drugs, and of the medical man whose chemistry is apt to be a thing of the past but who has had considerable training in therapeutics and microscopy.

DEAFNESS EXPLAINED.[1]

Mr. Balbi in a short pamphlet with this ambitious title makes a reasonable attempt to explain shortly to fellow laymen the principles of sound and of hearing, and the various types of artificial aid. Serious criticism must, however, be directed to a paragraph to the effect that "where the deafness has been gradual, hearing appliances can be tried as a means of relief without consulting a doctor; after all they can do no harm even if they are used." In the next paragraph he advises the reader to ascertain positively that his deafness is not due to wax before purchasing an appliance. Now he does not say how this can be done without the aid of a doctor, and it is a fact that wax deep in the canal is not easy to discover. The first statement passes over the very common form of deafness of gradual onset, due to obstruction of the Eustachian tube, in which it is most important that time should not be wasted on experiments with apparatus instead of seeking early treatment. In spite of these and a few similar faults, the book may be read with profit by deaf people before seeking the aid of appliances.

[1] Deafness Explained. By C. M. R. Balbi, A.C.G.I., A.M.I.E.E. With a foreword by Lord Charnwood. London: John Bale, Sons, and Danielsson. 1927. Pp. 45. 1s. net.

THE COMMONWEALTH FUND.

Mrs. Stephen V. Harkness, who died in New York last year, endowed a committee with a large sum of money to be administered for the "welfare of mankind," under no restrictions whatever. The story of what has been made of this remarkable opportunity is long, intricate, and uniformly fascinating, and is told in the annual reports of the Commonwealth Fund, of which the eighth has just been issued. The executors of the Fund selected half-a-dozen fields, decided exactly what they were going to do, and set about it with quiet persistence. The key-note of their efforts is constructive education, and, realising that no organisation was of the smallest use unless it was an integral part of the community among which it worked, they have devoted themselves mainly to sowing in the best soil they could find their special knowledge of the sciences of mental and physical health, to inducing communities to make their own executive machinery, to instructing them in its maintenance and expansions, and to training a large body of disciples to carry on and extend their work.

In 1922 they began a five-year programme of national instruction in the principles of child guidance and mental hygiene. Starting in Fargo, North Dakota, they established demonstration centres in two large towns and two rural districts in various States with the object of "translating into effective local action the available knowledge of measures which spell freedom and inspiration for the normal, healthful growth of children of all ages, as an integral part of a well-developed general health programme." The communities have all, as a result of these demonstrations, greatly increased their public health activities, and their example will undoubtedly stimulate others. The aim of the Fund is always to combine and unify existing protective and educational measures into a practical working programme. Next year this demonstration work will be superseded by the establishment of an Institute of Child Guidance for training psychiatrists, psychologists, and psychiatric social workers in practical child welfare work.

The Division of Education and Legal Research allots 20 fellowships annually to British university graduates to enable them to study education at an American university and acquire a first-hand knowledge of social conditions in the States. This interchange of educational ideas is a decided step towards mutual understanding between the two countries. The same division also publishes many sociological works, and studies administrative law and its practice — a very wide and difficult field in a country with numerous self-governing States. The Rural Hospitals Division assists country districts to build and maintain hospitals, and has laid down a programme for two every year.

The Fund is doing useful work in Austria, and it is a testimony to the soundness of its policy that the American personnel numbers only three, all the rest of the organisation being native. The various activities include child health centres, tuberculosis stations, school hygiene institutes, and health education generally. In an enterprise of this kind everything depends on the personality of the directors, and the surest guarantee for the permanence of the work is the continual and thorough training of potential successors to the present Committee that takes place as part of the execution of the Fund's objects.

THE AJAX PORTABLE ARC LAMP.

THE lamp which has been submitted to us is designed as a portable source of ultra-violet radiation to be taken to the patient's house and used on the ordinary house mains. Such a lamp must obviously be of reasonable size and weight, simple to use, and capable of running on any voltages direct or alternating. The instrument submitted consists of a strong metallic case, about the size and shape of a large attaché case, heavily nickel-plated, which contains a small automatic arc and the necessary resistances. The arc itself is permanently mounted at one end of the case and is not intended to be removed when in use. This makes for safety in handling and for simplicity, as the minimum of fitting-up is required. The end facing the arc forms a sliding panel which can be completely withdrawn when a wide-angled beam, suitable for the irradiation of a large area, is required. For localised treatment, the sliding front carries a diaphragm and a water-cooled chamber fitted with rock crystal windows. The water cooling is effected by a glass reservoir on the top of the instrument convection currents causing the water to circulate between the reservoir and the water chamber. This simple arrangement was found to be quite effective for the short period required—in ten minutes the temperature of the water had risen only 7° C., whilst the quartz lens, though warm, was not uncomfortably hot.

The arc is formed between cored carbons, either tungsten-cored or so-called polymetallic, the latter being cored with a mixture of metals designed to give intense radiation in the region of most therapeutic value. On the back of the instrument three knife switches are fitted. One is the main switch for the arc, the second has two positions corresponding to main voltages of 220 and 110 respectively. The instrument is sufficiently flexible to allow of its use on other voltages varying within 10 per cent. of these values. The third switch allows the use of the magnetic blower which is fitted to the arc; this is an electro-magnet which forces the arc forward in the form of a flame when in use and thereby increases the output of radiation. The main switch has two contacts, one controlling the arc in the case and the second switching the current to a second arc which is mounted in a hood-shaped reflector carried at the end of an adjustable arm attached to the top of the case. This arc can be used with a rock crystal lens applicator as described above, but in this case, no cooling device is fitted, the heat not being so intense as for the internal type.

The instrument takes about eight ampères of current and was found on test to give a very steady output. The case tended to get hot during a prolonged run but, owing to the efficient ventilation of arc and resistances, no damage was detected. The radiation from the bare arc and also after it had passed through the applicators was examined with a Hilger quartz spectroscope. The spectra extended as far as 2100 Angstrom units and the quartz lenses were found to be transparent over the whole range. The polymetallic carbons gave a spectrum of closely packed lines over practically the whole range. A few minor points of design—e.g., the disposition of the switches on the case, call for slight modification, but they are by no means important and are already receiving the attention of the manufacturers.

In general, the Ajax lamp seems to be very well designed for its purpose—namely, to provide a portable source of ultra-violet rays which can be used over a wide range of varying conditions and for a number of different purposes. It may be obtained from the manufacturers, Ajax Ltd., 117, Central-street, E.C.1.

THE SCANDAL OF HOMEWORK.

OUR attention has been called to an article in the last issue of the *Teachers' World* which describes, with detailed evidence in support of the view, the possible defeat of the true purpose of education by the intolerable burden which the homework set for children is becoming. The educational journal is definite in its statement that "the ridiculous system of excessive homework is fast becoming a menace to the physical and mental welfare of the adolescent." We do not know of any medical evidence which would bear out to the letter this formidable indictment, but, as the *Teachers' World* will refer to the subject in its following issues, there may be more to be said on this ground. Of the futility as well as exhausting nature of the kind of homework which apparently is being set, there can be no doubt, when we read the examples set out. As might be expected, the teacher of mathematics appears to be the worst offender in setting unsuitable and excessive homework. Here it seems that the sort of problems that children in their early teens are asked to deal with require that monotonous calculation which, instead of leading to a real mathematical outlook, and so providing a basis upon which advanced mathematical work can be built, can only succeed in disgusting the pupil with the whole study. The pursuit of mathematics can be made highly interesting—even a fascinating intellectual exercise while it deals with the coldest facts of life; it is deplorable that the reverse should so often occur through the unintelligent approach of teachers to their subject.

PARENTERAL MERCURIC POISONING.

THE administration by the mouth of sodium hyposulphite (that is to say, $Na_2S_2O_4$ in the strict chemical sense, not the thiosulphate commonly known as "hypo") has been found by E. Hesse [1] to be a fairly trustworthy antidote to corrosive sublimate similarly administered. Of 17 dogs receiving lethal doses of sublimate, 13 recovered when this substance was administered. The action is probably partly a reduction of the soluble salt to the metal and partly a formation of the insoluble sulphide. As an industrial poison mercury is usually taken through the lungs, and could best be treated by intravenous injections. Sodium hyposulphite, however, has a reducing action on oxyhæmoglobin, and Hesse has recently experimented with various compounds containing sulphur, and as a result of his experiments recommends the use of the thioacetates. Of these the strontium salt appears to be the most satisfactory for administration. Injections of at least 1 g. a day should be continued for one or two weeks. This use of sulphur compounds, which appear to act by forming the extremely insoluble mercuric sulphide is interesting, and is worthy of consideration by those who have the medical care of workers dealing with mercury or mercurials.

[1] Arch. Exp. Path. Pharm., 1926, iii., 266–278.